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WEED ABSTRACTS

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NOTES FOR READERS

Weed Abstracts endeavours to provide a comprehensive coverage of the world's literature on weeds, weed control and closely allied subjects. To this end, over 370 journals and nearly 100 annual reports are regularly searched. Other journals, reports, bulletins, etc. are abstracted as they are seen. Additional coverage is obtained through agreements with other abstracting organisations.

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As far as possible the journal abbreviations used are those given in the World List of Scientific Periodicals. Holding libraries in Oxford and elsewhere are also taken from the World List, e.g. O.BO = Botany Department, Oxford. Numbers at the end of abstracts, e.g. 75(492) are for internal use only.

When a paper is by more than one author, the address of the first author only is given.

Where an abstract is taken from an abstracting journal the acknowledgement follows the abstract, e.g. Herb.Abstr., 2,163. Where it is quoted only in part the acknowledgement is preceded by the word "from", e.g. From Biol.Abstr., 2,294.

The Information Section is always pleased to receive comments and suggestions for the improvement of Weed Abstracts.

* An asterisk before the author's name indicates that only the title of the paper has been seen.

Continued from the inside back cover

ac	- acre(s)	in.	- inch(es)	p.s.i.	- pounds per square in.
a.e.	- acid equivalent	kg	- kilogram(s)	v/v	- volume/volume
a.i.	- active ingredient	l	- litre(s)	w/v	- weight/volume
cm	- centimetre(s)	lb	- pound(s)	w/w	- weight/weight
d.b.h.	- diameter at breast height	m	- metre(s)	>	- greater than
		ml	- millilitre(s)	<	- less than
ft	- foot(feet)	oz	- ounce(s)	#	- pounds per acre
g	- gram(s)	post-em.	- post-emergence	±	- with or without
gal	- gallon(s)	pre-em.	- pre-emergence		
ha	- hectare(s)	p.p.m.	- parts per million		

Language abbreviations: an initial capital denotes the language of the article, a small letter that of the summary: - Dan. - Danish, Du. - Dutch, E. - English, F. - French, G. - German, It. - Italian, Jap. - Japanese, Nor. - Norwegian, Russ. - Russian, Span. - Spanish, Sw. - Swedish.

998. ALLEY, H.P., BOHMONT, D.W., TIMMONS, F.L. and COMES, R.D. Wyoming weed control recommendations, 1961. Circ.Wyo.agric.Exp.Sta., 1961, 71R, pp.16.
Recommendations are given for general weed control in wheat, barley, oats, maize, sorghum, flax, lucerne, field beans and sugar beet, for a number of specific weeds, and for temporary and permanent soil sterilants. - D.M.L.S. [23(78.7)]

999. HEITES, E. Chemical weed control in field crops. Bull.Mont.State Coll. (revised 1961), 303, pp.28, tabs.1.
A revised version of the 1959 bulletin (see Weed Abstr. 9,483). It includes the following recommended rates for barban for the control of wild oats [Avena fatua] - in winter and spring wheat barley, safflower and (tentative, post-em.) peas 0.25-0.4 lb. and in sugar beet post-em. 0.75 lb., all to be applied in 5-10 gal water, at the 2-leaf stage of A. fatua. The recommended rates for A. fatua control with diallate which should be incorporated pre-sowing are: in winter and spring wheat and barley 0.75-1.25 lb. in 10-20 gal water; in flax 0.75-1.25 lb. in 10 gal water; in peas 0.75-1.25 in 20-40 gal water; in safflower and sugar beet 1-1.5 lb. in 20-40 gal water. Other recommendations include dinoben [2,5-dichloro-3-nitrobenzoic acid] 2 lb. in 10-20 gal water for the control of annual grasses in safflower and diuron 2 lb. pre-em. for general weed control in lucerne seed crops. - D.M.L.S. [15(78.6)]

1000. BONDARENKO, D.D. Weed control by herbicides in field crops. Bull.Ohio State Univ.Agric.Ext.Serv., 1960, 398, pp.48.
A revised version of the 1958 Bull. No.370 (see Weed Abstr. 8,362). Recommendations are the same as those given in the 1960 Extension Leaflet 75 (see Weed Abstr. 9,210 and 9,484). - D.M.L.S. [51(77.1)]

1001. UNITED STATES AND CANADA. Weed control in field crops [9 reports].
Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 94-7.
1. Weed control in sugar beet. In trials in Manitoba in which wild oats and Setaria viridis were sown 1 day before pre-sowing treatments, the following were applied pre-sowing, followed by incorporation and sowing sugar beet on the same day. EPTC 2 and 4 lb., endothal 3 and 6 lb., di-allate 1 and 2 lb. Dalapon 2 and 4 lb. was applied post-em. (sugar beet 3-5 leaves, S. viridis up to 6 in. tall and wild oats up to 12 in. tall). EPTC 2 lb. gave 55 and 100% control of wild oats and S. viridis and the 4 lb. rate complete control of both, but sugar beet yields were less than those of hand-weeded controls (14.5 ton roots/ac, compared with 19.2). Di-allate 2 lb. gave complete control of wild oats, but none of S. viridis. Dalapon 2 lb. gave complete control of S. viridis, but none of wild oats. In trials in Alberta, the following were applied pre-sowing and disced in: propham and CDAA 4, 6 and 8 lb., TCA 10, 15 and 20 lb., EPTC 2, 3 and 4 lb. and di-allate 2, 4 and 6 lb., with sugar beet sown immediately afterwards. Best control of wild oats was given by di-allate 2 lb. (96%) and EPTC 3 lb. (94%). Most treatments reduced unthinned stands of sugar beet slightly, but this was of no consequence at harvest. Where > 90% control of wild oats was secured, the time taken by weeding and thinning was reduced by more than 50%. The low and medium treatment rates resulted in a mean yield increase of 1 ton roots/ac. In trials in Ohio at 2 locations, the following herbicides were applied to plots on which Setaria sp. had been sown: pre-sowing EPTC and endothal liquid and granular 1.5, 3 and 6 lb. and DCU 6 lb., pre-em. EPTC and endothal liquid and granular 1.5, 3 and 6 lb., dalapon 1.5 and 3 lb. and TCA 3 and 6 lb., post-em. (2-4 leaf stage of sugar beet) dalapon 3 and 6 lb., TCA 6 lb. and endothal 1 and 2 lb. EPTC pre-sowing and pre-em. at 3 and 6 lb. gave good to excellent weed control at both locations, though sugar beet stands were reduced slightly. All DCU and TCA treatments gave excellent control of Setaria sp., but not of broad-leaved weeds.
2. Tobacco. In trials in Kentucky, Burley tobacco was transplanted into silt loam soil and the following herbicides were applied: EPTC 2,3 and 4 lb. incorporated 1 day before transplanting, EPTC 2 and 3 lb., incorporated 1 day before and applied to the soil surface at 4 lb. 1 day after transplanting, trietazine 2 and 3 lb. applied to the soil surface 1 day before, or 2,3 and 4 lb. applied 1 day after transplanting. The principal weeds were Amaranthus retroflexus, Digitaria sp. and Sida spinosa. Weed number reductions were greatest with the following: EPTC 2,3 and 4 lb. pre-planting (61, 88 and 98%, respectively), trietazine 2 and 3 lb. pre-planting (85 and 87%) and trietazine 2,3 and 4 lb. post-planting (82, 91 and 93%), EPTC 3 lb. pre- or post-planting and trietazine 2 lb. pre-planting resulted in good weed control for several weeks and little injury after transplanting. In trials on weed

control in tobacco plant bed soils, DMTT 6 7.5 and 9 lb/100yd^2 drenched in with 0, 150 or 300 gal water, was applied on 3rd October to soil 1 day after rotary cultivation. The soil was protected against further wetting by plastic sheeting for 2 weeks after treatment. In the following March, the treated plots were scarified to a depth of 1 in. and sown to tobacco. No treatment reduced emergence or early growth of the tobacco. The mean reduction in weed numbers for all DMTT treatments was 90%, with no significant differences between the different rates of treatment. The different drench treatments had little effect on the degree of weed control secured. In similar trials in which DMTT + calcium cyanamide were used, treatments which included calcium cyanamide reduced the growth of tobacco plants.

3. Kentucky bluegrass (Poa pratensis) for seed. Data are given of the results of two trials, in the first of which 2,4-D and 2,3,6-TBA were applied in spring and in the second of which, simazine, neburon, chlorpropham, CDAA, NPA and polychlorobenzoic acid were applied in autumn.

4. Sunflowers. In trials at 3 locations in Minnesota, CDAA 4 lb pre-em. gave good control of Setaria sp. and partial control of broad-leaved weeds, with no injury to sunflowers. In another trial CDAA 6 lb + trichlorobenzyl chloride resulted in some injury, as did CDAA 6 lb post-em. applied to plants 1- to 2-in. tall. Simazine 2 lb greatly reduced sunflower yields, but EPTC 15 lb applied to the soil surface or 3 in raked in had no effect on the crop.

5. Rape for seed. Data are given of the results of trials in Saskatchewan in which chlorpropham, propham, O-2,4-dichlorophenyl O-methylisopropylphosphoramidothioate (Zytron) and fenuron TCA (Urab) was applied pre-em. with a logarithmic sprayer at an initial rate of 16 lb. Zytron had no apparent effect on either crop or weeds.

6. CDAA and EPTC for weed control in 14 crops of potential industrial use. In trials in Minnesota, CDAA 4 lb and EPTC 3 lb were applied pre-em. in 40 gal spray immediately after sowing the crops on 5th or 19th May or 2nd June. CDAA applied on 5th May had little effect on either crops or weeds; that applied on 19th May and 2nd June gave fair and good control, respectively, of susceptible weeds. Gophers (Citellus spp.) dug up most of the sunflower seed sown on plots treated with CDAA, but not that on plots treated with EPTC. The following is a summary of the reaction of the different crops to CDAA and EPTC, respectively, (R = resistant, MR = moderately resistant, MS moderately susceptible, S = susceptible and VS = very susceptible): Helianthus annuus R, R; Eruca sativa R, MS; Raphanus sativus R, MS; Euphorbia marginata R, MS; Crambe abyssinica MR, S; Brassica campestris MS, MS; Sorghum almum MS, --; Daucus carota S, VS; Rudbeckia bicolor S, S; Eupatorium rugosum S, MS; Satureja hortensis S, VS; Nepeta mussinii S, VS; Matthiola bicornis VS, VS. - P.J.B. [O.W.]

1002. DURKSEN, D. and HOWDEN, J. Weed control in special crops. Publ. Manitoba Dept. Agric. Conserv., 1960, 32 4, pp. 4.
Given general instructions for cultural control measures in row crops and recommendations for the chemical control of wild oats [Avena fatua], green foxtail [Setaria viridis], and broad-leaved annuals in certain specified crops. These include TCA (sodium) 4-6 lb for the control of S. viridis to be applied pre-em. or 2 weeks post-em. in sugar beet, and in field peas (not canning peas) to be applied when S. viridis is in the seedling stage. - D.M.L.S. [252(71)]

1003. UNITED STATES AND CANADA. Weed control in small grains [21 reports]. Res. Rep. Joint 16th N. Central and 10th W. Canadian Weed Control Conf., 1959, 86-92.
1. In trials in Alberta with barban for controlling wild oats in wheat, wheat and wild oats were sown on 15th May and treated with barban at 0.5, 1 and 2 lb either on 27th May when the plants had 1-1.25 leaves or on 2nd June when they had 2-3 leaves. Treatment of both species at the 2- to 3-leaf stage resulted in the greatest reduction in grain yields, plant weights and tiller numbers. In further field trials in Alberta, barban 0.25, 0.5 and 1 lb was applied in 5 or 30 gal water to wheat and wild oats at the 1- to 1.25-leaf stage or later at the 2- to 3- leaf stage. Low-volume treatments resulted in the greatest injury to the wild oats following treatment at either stage of growth. Greatest wheat yields and lowest wild oat yields resulted from treatment with 1 lb in 5 gal spray at the 2- to 3-leaf stage. In trials in which barban 0.5 lb + MCPA 0.5 lb in 5 gal water was applied to wild oats mostly at the 1.5-leaf stage, in wheat at the 2- to 3-leaf stage (undersown with a lucerne/Bromus inermis mixture) wild oat numbers at harvest were little affected, but dry weights were drastically reduced. Wheat

yields were increased 25% by the herbicidal treatment and the undersown herbage species showed no apparent injury. In trials on the reaction of wheat var. Thatcher, Saunders and Selkirk to barban, 0.5 and 2 # was applied at (a) the 1.5- to 2-leaf and (b) at the 4-leaf stage. Barban 0.5 # applied at stage (a) did not affect Thatcher or Saunders, but reduced Selkirk yields by 10%; applied at stage (b) the 0.5 # rate reduced the yields of Thatcher, Saunders and Selkirk by 25, 18 and 10%, respectively. The 2 # rate reduced the yield of all varieties by at least 45%. In further trials on the reaction of the barley varieties Gateway, Husky and Olli, barban 0.5 # at the 1.5- to 2-leaf stage did not affect the yield of any varieties. Treatment with 0.5 # at the 3- to 4-leaf stage reduced the yield of Husky and Olli by 15 and 30%, respectively. Barley maturity was delayed by about 4 days by treatment at either growth stage with 0.5 # and by 8-10 days by treatment with 2 #. The 2 # rate at the 1.5- to 2-leaf stage reduced the yield of Gateway and Husky by 15% and at the 3- to 4-leaf stage, reduced the yield of all varieties by at least 60%. In trials in Alberta with wheat and barley, barban was applied at 0.25, 0.5 and 1 # at the 1.5-leaf or 4-leaf stages of wild oats in either 6 or 30 gal water. Barban 0.5 and 1 # in 6 gal water applied at the 1.5-leaf stage caused the greatest reduction in dry weight of wild oats (25% at grain maturity) and the greatest increase in wheat yield (20%). Results with barley were similar, but as the crop matured about 5 weeks earlier than wheat, suppression of wild oats was more marked. In trials in Saskatchewan, barban was applied with a logarithmic sprayer (maximum rate 2 #) to wild oats at 4 different growth stages from the 1.5- to 1.75-leaf to the 4-leaf stage, in barley rape, flax, oats and wheat. Conditions were very dry in these trials. No crops except oats, were affected by the 2 # rate of barban. Spray volume rates did not appear to affect the crop or the control of wild oats. Treatment of wild oats at the 1.75- to 2-leaf stage gave poor control on 3 out of 9 plots; on 6 plots, 1.1, 1 and 0.8 # gave 95, 90 and 75% control, respectively. Treatment at the 2- to 2.75-leaf stage gave satisfactory control on 4 out of 9 plots. In several factorial trials in the U.S.A. and Canada on the control of wild oats in flax, barley and wheat with barban, rate per ac. and time of application, only, appeared to affect the activity of barban. Rates of 0.5 # were slightly less effective against wild oats than 1 #, but the latter rate stunted wheat and flax. Best control was secured by treating wild oats at the 1.5- to 2.25-leaf stage. There did not appear to be any interaction between MCPA amine and barban applied as a mixture, in effect on wild oats or broad-leaved weeds. The use of hollow-cone nozzles resulted in about twice as great activity of barban against wild oats as fan-type nozzles; solid cone nozzles were intermediate in effect. In trials at 2 locations in W. Nebraska, barban at rates of 0.25-2 # was applied to winter wheat in mid or late October to control Bromus tectorum. The B. tectorum was in the 2-leaf stage at one location and was well tillered at the other. The 2 # rate gave poor to fair control of B. tectorum; control with lower rates was poor. Rates > 1 # injured the wheat. In trials in Alberta, studies were made of the reaction of the flax varieties Redwing, Rocket and Redwood to barban 0.5 and 2 # in 5 gal water at the 3- and 8-leaf stage of the flax. Redwing was the most tolerant variety, followed by Rocket and Redwood.

2. In trials in Saskatchewan on the use of di-allate for controlling wild oats in barley and flax, rates of 0.8-3 # were used, with either one or two discings immediately after application. Two discings resulted in better wild oat control than one and where two discings were carried out, rates of 1.5 # and above gave 95% control, or more, of wild oats. In glasshouse trials, di-allate and barban 1, 2, 4 and 8 # and fenac 2, 4, 8 and 16 # were applied to sterilized soil, followed by incorporation into the top in. of soil and the sowing of spring wheat, winter wheat, barley and flax. Di-allate allowed good survival and growth of barley, killed wild oats and seriously damaged wheat. Barban, even at 8 #, had limited effects on wild oats and less effect on wheat and barley. Fenac at > 2 # injured wheat more than wild oats and was very injurious to barley. In field trials in Alberta, plots were treated with di-allate and EPTC 2,4 and 6 # and 2,6-dichlorobenzonitrile 1, 2 and 4 #, double-disced and sown with wild oats, barley, wheat and flax. Di-allate gave best control of wild oats, with the least detrimental effect on the crops. In 2 field trials in Alberta on the use of di-allate for controlling wild oats in barley and flax, in the first trial, di-allate at 2, 2.5 and 3 # gave 80-85% reduction in wild oat numbers 5 weeks after treatment. Discing twice after applying di-allate had no advantages over discing once. Thorough cultivation before sowing barley gave effective wild oat control

on both treated and untreated plots. In a second trial di-allate 1, 2 and 3 # resulted in 73, 82 and 98% control of wild oats and rates of 2 and 3 # increased flax yields by about 300 #. In trials in Saskatchewan on the use of di-allate and EPTC, these herbicides were applied with a logarithmic sprayer at rates of 0.4-6 # in 16 gal water, followed by discing either once or twice on the same day and sowing barley, wheat, flax and rape. Discing twice appeared to result in slightly better control of wild oats than discing once. EPTC at 2.7-2.9 # and di-allate 2.2-2.8 # gave 95% or more control of wild oats. EPTC at >2.8 # injured barley and EPTC at >1.8 # and di-allate > 25 # injured wheat. Rape was injured by EPTC > 1 # where 2 discings were used. Flax tolerated EPTC at rates up to 6 # with 1 or 2 discings and di-allate at rates up to 6 # where 2 discings were used. The type of crop had no significant effect on the degree of control of wild oats. In trials in Minnesota in which amiben and EPTC were used for weed control in flax, these herbicides were either applied and incorporated one day before sowing flax (pre-sowing) or applied (amiben, only) 1 day after sowing (pre-em.). Pre-sowing treatment with EPTC 3 # and amiben 2 # reduced flax stands by 20%. Amiben 2 and 6 # pre-em. reduced flax stands by 5 and 35%, respectively. EPTC pre-sowing at 1.5 and 3 # reduced annual broad-leaved weed stands by 20 and 70%, respectively, and annual grasses (including Echinochloa crusgalli and Setaria sp.) by 65 and 85%. Amiben pre-sowing and pre-em. 2 # reduced annual broad-leaved weeds by 75% and 6 # pre-em. by 95%. Undersown lucerne was not damaged by EPTC, but was eliminated by all amiben treatments. In trials in Alberta, EPTC 4 and 8 # and chlorpropham 6 and 12 # were applied to stubble in mid October 1958 to control wild oats. The stubble was disced (one way) before and after treatment. In mid May, 1959, barley and flax were sown. Marked reduction in wild oat numbers and considerable increases in yield of barley and flax followed treatment with EPTC 8 # and, to a lesser extent, with 4 #.

3. In trials in Manitoba, studies were made of the reaction of wheat, oats, barley and flax on relatively weed-free plots to treatment [stage of growth at treatment not given] with 2,4-DB and MCPB butyl ester and diethanolamine salt, mecroprop sodium salt and CP 1815 (MCPA + 2,3,6-TBA). Only 2,4-DB ester 0.75 and 1 # significantly reduced yields (especially in oats and barley). Data from trials in Saskatchewan are given of the effect on crops and weeds (wheat, Polygonum convolvulus, Chenopodium album, Thlaspi arvense and Salsola pestifer) of 2,4-D butoxyethanol ester, 2,4-D butoxyethanol ester invert emulsion, 2,4-D mixed butyl esters, mecoprop, barban and MCPA butyl ester. Data are also given of the effect on weeds and on seedling stands of red clover, sweet clover, lucerne, alsike clover, white clover and birdsfoot trefoil of treatment with MCPA, 2,4-D mixed amines, sodium salt of 2,4-DB and MCPB, MCPB mixed amines and MCPA + 2,4-DB.

4. The results are given of 2 trials in Wisconsin on the response of oats to residues of triazine herbicides in the soil. In the first trial simazine, trietazine, propazine, ipazine, each at 1 2 or 4 # chlorazine (2-chloro-4,6-bis(diethylamino)-s-triazine) and CDAA 4 #, and diuron at 2 # were applied pre-em. on 24th May, 1957, to maize on Miami silt loam. No cultivations were carried out, the plots were ploughed after harvest and oats and lucerne sown in mid April, 1958. Only plots treated with propazine 4 # showed significant reductions in oat yields compared with non-weeded controls. No injury was noted in lucerne. In the second trial, simazine, propazine, atrazine, prometone (2-methoxy-4,6-bis (isopropylamino)-s-triazine and 2-chloro-4-methylamino-6-isopropylamino-s-triazine) (G-30026) were applied pre-em. on 14th May, 1958, at 1, 2 or 4 # on plots sown to maize. Oats and lucerne were sown in late April, 1959. Plots treated with propazine and atrazine 4 # showed most injury to the oats, and injury was considerable on plots treated with simazine, prometone and G-30026. Oat yields on plots treated with rates of 1 and 2 # were not significantly lower than those on clean-cultivated plots, whereas yields on plots treated with 4 # of all herbicides were significantly reduced. In 1957, rain in the month after treatment was abundant and weed control was excellent. In 1958, the 3 weeks after treatment were rainless and weed control was only fair. - P.J.B. [O.W.]

1004. THELLOT, B. Pratique du desherbage selectif des cereales avec les colorants nitres. [The practice of selective weed control in cereals with dinitro herbicides.] Phytoma, 1956, 107, 18-23, (F.).

An article giving general instructions for the use of dinoseb and DNOC in cereals and a susceptibility grading of 46 common weeds. A table is included which gives the correct dosage rates of the 2 herbicides for the control of "ravenelle" [Raphanus raphanistrum] under 5 different environmental conditions.

Snails in treated cereals are killed by the 2 herbicides even if not directly touched by the spray, but move into treated areas after application, only. It has also been observed that damage caused to spring barley by the parasite Mayetiola avenae has been greatly reduced through destruction of eggs and larvae by the dinitro herbicides. - D.M.L.S. [O.W.]

1005. RAHIL OV, A.U. [Weed plants of wheat in direct sowing without irrigation]. Trudy Tashkent. Farmatsevt. Inst., 1960, 2, 119-32.
Lists weeds recorded from wheat fields in various localities in the northern part of the Tashkent oasis. - From Ref. Zh. (Biol.), 1961, (7),7 G731. - K.A.B.

1006. SHEGNOV, B. and DONCHEV, N. [Chemical weed control in maize sowings]. Kooperat. Zemledelie, 1960, 15, (5),34-5. From Ref. Zh. (Biol.), 1961, (1),1 G829. K.A.B.

1007. POIGNANT, P. L'emploi des colorants nitres pour le desherbage des mais-grain. [The use of dinitro herbicides for weed control in grain maize]. Phytoma, 1959, 108, 11-14, (illus.), (F.), bibl.3.
Gives general instructions and compares their use in maize with that of simazine and 2,4-D. - D.M.L.S. [O.W.]

1008. UNITED STATES AND CANADA. Weed control in maize [7 reports]. Res.Rep. Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 81-3.
1. Comparison of granular and liquid formulations of herbicides on maize. In trials in 1959, 2,4-D 1, 2 or 4 #, 2,4-D 1 # + CDAA 2 #, 2,4-D 2 # + CDAA 2 #, and simazine 1, 2 or 4 #, each as liquid or granular formulations, were applied pre-em. in late May. The plots were (a) band-treated and rotary-hoed (4th June), (b) band-treated, not rotary hoed, (c) herbicides applied overall, not rotary hoed. On 25th June, plots treated overall or in bands with simazine spray 2 #, simazine spray or granular 4 #, 2,4-D 1 # + CDAA 2 # spray, 2,4-D 2 # + CDAA 2 # spray or granular, showed 90% or more reduction in weed stands (annual broad-leaved and grass). Plots treated as (a) showed better weed control and somewhat higher maize yields than those not rotary-hoed.
2. Pre- and post-em. weed control in maize on muck (organic) soil. In trials in Indiana, pre-em. treatment of maize (sown 29th May) on 2nd June with EPTC liquid or granular 6 #, simazine 3 #, atrazine 4 # or 2,4-D propylene glycol butyl ether ester 4 # gave fair to good control of annual broad-leaved and grass weeds. Atrazine 2 # applied post-em. when the maize was at the 2-leaf stage gave good weed control; amitrole 1 # gave fair weed control. It appeared that herbicidal rates on organic soils should be 50-100% higher than those suitable for mineral soils.
3. Comparisons of granular and liquid formulations for weed control in maize. Data are given of the respective weights of weeds at harvest following pre-em. treatment of maize with a number of herbicides in liquid or granular form. Simazine and atrazine resulted in considerably better weed control than the other herbicides. There were no consistent trends in the effect of either formulation.
4. Control of weeds in maize with pre-em. herbicides. In trials on silt loam soils at Lexington (L) and Henderson (H), Kentucky, the following herbicides applied pre-em. in 39 gal spray/ac. gave 90% or more control of weeds (determined in July): fenac 2 # (L), tris(2-methyl-4-chlorophenoxyethyl)phosphite (B.528) 6 # (L), simazine 2 and 3 # (L) and 2 # (H), atrazine 3 # (L), and 2 # (H), EPTC 4 # (L) and 3 # (H). Cultivation alone resulted in 90% control. At Lexington, no treatment caused crop injury, but at Henderson, tris(2,4-dichlorophenoxyethyl)phosphite, B.528, 2,4-D and (to a greater extent) EPTC all caused crop injury.
5. Herbicides used early post-em. in maize. In trials in Kentucky on Burgin silt loam herbicides were applied 2 days after maize had begun to emerge. As determined at 4 weeks after treatment, the following reductions in weed numbers (annual broad-leaved and grass weeds) were secured: atrazine 2 # 98%, 3 # 99%, diuron 0.5 # 89%, 1-chloro-N-(3,4-dichlorophenyl)-N,N-dimethylformamidine (Dupont 685) 0.5 # 89%, 1 # 95%, neburon 1.5 # 86%, dinoseb + dalapon 56%, 2,4-D + dalapon 79%, 2,3,6-TBA 1 # 88%, 2 # 89%. Amitrole 0.75 and 1 # gave very poor control. Cultivation gave 89% control. No reduction in stands or crop injury was noted at harvest.
6. Pre-em. weed control in maize on mineral soil. In trials in relatively dry conditions on silt loam soil, pre-em. treatment of maize with 2,4-D propylene glycol butyl ether ester 2 #, atrazine 3 # liquid or 2 # granular, CDAA 2,3 or 4 # + trichlorobenzyl chloride or trichlorotoluene 5, 7.5 or 10 #, and CDAA 2, 3 or 4 # + 2,3,6-TBA 0.5 # gave fair to good control of grass and broad-leaved weeds.
7. Herbicides on maize. The results are

reported of trials with pre- and post-em. treatments in Ohio at Columbus (C) on Miami-Brookston silty clay loam and at Hoytville (H) on clay loam soil. Of pre-em. treatments, simazine 1 and 2 # gave more than 95% control of weeds at C., but was unsatisfactory at H. Atrazine 1, 2 and 3 # gave nearly 100% control at C.; at H. it gave 60-80% control of broad-leaved weeds, but poor control of Setaria sp. Fenac 2 and 4 # gave 90% or more control at C. and 70-80% control at H; results with 2,3,6-TBA 1.5 and 3 # were similar. Tris(2,4-dichlorophenoxyethyl)phosphite 4 and 6 # and CDAA 4 # gave excellent control at C., but not at H. Of treatments applied at emergence (H., only) atrazine 1, 2 and 3 # gave 60-90% control of broad-leaved weeds, but poor control of grasses. Amitrole 1 # and 2,3,6-TBA 3 # gave 80% control and 2,4-D 0.5 # + dalapon 2 # gave 75-85% control. Simazine and diuron gave poor results. In post-em. trials (2- to 4-leaf stage of maize at C.; 5- to 7-leaf stage at H.), amitrole and amitrole-T (amitrole + NH_4SCN) 0.15 and 1 # gave 80-95% control at both C. and H., atrazine 1,2 and 3 # gave 85-100% control at C., but gave good control at H. only at the 3 # rate. Post-em. treatment with amitrole, amitrole-T and 2,3,6-TBA at the 5- to 7-leaf stage at H. and with dinoseb at the 2- to 4-leaf stage at C. caused transient damage to the maize. - P.J.B. [O.W.]

1009. MAKODZEBA, I.A. and FISIUNOV, A.V. Simazine, a herbicide for weed-control in maize fields. Vest. Sel'skokhoz. Nauki, 1960, (7), 134-137, (Russ.), tabs. 3, bibl. 5.

Presents data from trials in 1958 and 1959 at the Erastov experimental station of VNIIK (All-Union Maize Institute) on plots of hybrid VIR 42 maize. Simazine was applied pre-em. with soil or in suspension at 1, 2, 4, 6 and 8 kg/ha and post-em. at 2 kg/ha, and 2,4-D was applied pre-em. in 1000 l water/ha at 0.75 kg/ha. When soil moisture was sufficient, simazine killed grasses in 9-12 days and dicotyledons in 9-10 days. The number of weeds killed increased as simazine dosage increased, and those weeds that survived developed poorly compared with untreated controls. Germinating seedlings of Convolvulus arvensis were effectively killed by simazine, but not shoots from rhizomes. In all plots treated with simazine or 2,4-D, maize height growth and yields at harvest were slightly greater than those of controls, the yield increasing as simazine dosage increased.

Tests of the residual toxicity of simazine showed that crops of barley grown the year following treatment were not affected at 1 and 2 kg/ha, but were markedly reduced where 4-8 kg/ha had been applied. The higher dosages were to be recommended only where maize was to be sown again.

Insufficient soil moisture resulted in lower % of weeds killed. Tests with Setaria viridis, Echinochloa crusgalli, Chenopodium album and Polygonum convolvulus showed that with high soil moisture contents, nearly all weeds were killed by simazine at 0.5 kg/ha, with the exception of E. crusgalli. At 45% moisture, dosages of 2 kg/ha killed virtually all weeds. In dry areas, it was recommended that simazine should be applied before emergence of the maize and worked into the soil. - K.A.B. [G.R.L.]

1010. LIMAKOV, N.A. [The use of the herbicide 2,4-D in maize culture.] Zemledelie, 1960, (6), 88-90.

In trials at the Voronezh Agricultural Institute with 2,4-D for weed control in maize, best results were obtained by applying 0.7-1.5 kg/ha at the 3-5 leaf stage. Higher rates damaged the maize. Good results were also obtained by applying 2,4-D to the soil at 3-5 kg/ha during pre-sowing cultivation. From Ref. Zh. (Biol.), 1961, (1), 1 G830. - K.A.B.

1011. RAKHIMOV, A.U. [Weed plants of Zea mays L.] Trudy Tashkent. Farmatsevt. Inst., 1960, 2, 113-8.

Lists weeds of maize fields in parts of Tashkent province. The families Gramineae, Compositae, and Leguminosae have the most species. Of 46 species described, 56% are annual or biennial, and 44% perennial. From Ref. Zh. (Biol.), 1961, (7), 7 G726. K.A.B.

1012. PAIXAO, J. DA C. Controle de hervas daninhas em cultura de milho com Estericide e Weed-B-gon. [Control of weeds in maize with Estericide and Weed-B-gon.] An. Semin. Brasil Herbicidas Ervas Daninhas 1958, 1959, 2, 61-70, (Portuguese), bibl. 3.

There was no significant difference in yield from pre-em. applications of Estericide (containing 21.5% a.e. each of the propylene glycol esters of 2,4-D and 2,4,5-T) at 3 l/ha and of Weed-B-gon 64 (2,4-D alkanolamine a.e. 30%) at 3 and 5 l/ha. All treatments controlled weeds well enough to dispense with the first cultivation. - D.M.L.S. [O.W.]

1013. GONDIM, G.S. Emprego de herbicidas seletivos em milho pelo metodo pre-emergente, na regiao de Botucatu. [Pre-emergence use of selective herbicides in maize, in the region of Botucatu.] An. Semin. Brasil. Herbicidas Ervas Daninhas 1958, 1959, 71-80, (Portuguese), tabs. 9.

There were no significant differences in maize yields from the following pre-em. treatments: Weed-B-gon 64 (2,4-D alkanolamine 30%) 30 and 50 ml/100 m^2/4 l water and Estericide TD 2 × 21.5% a.e. each of 2,4-D and 2,4,5-T alkanolamine esters) 20 and 30 ml/100 m^2/4 l water; however, the higher rate of Weed-B-gon resulted in the lowest crop stand and yield and the best weed control. Ricinus communis, Euphorbia prunifolia, Ipomoea longicuspis and Brachiaria plantaginea were resistant to all treatments. - D.L.L.S. [O.W.]

1014. UNITED STATES AND CANADA. Sorghum [4 reports]. Res. Rep. Joint 16th N. Central and 10th W. Canadian Weed Control Conf., 1959, 83-4.

1. Herbicides for weed control in grain sorghum. Trials in Minnesota during 1957-9 indicated that CDAA 4-6 # pre-em. was usually necessary in addition to normal cultivation for satisfactory weed control and crop yields. CDAA 6 # was more effective than the 4 # rate for controlling weeds, especially where Amaranthus retroflexus or Chenopodium album was frequent. For Setaria spp. control, increasing the rate from 4 # to 6 # was not economic. 2,4-D amine 0.25-0.5 # post-em. was more economical than the use of CDAA for non-grass weed control. Simazine 2 or 4 # either pre- or post-em. gave good weed control, but sometimes injured the sorghum. In trials at Rosemount in 1959, CDAA 4 # + either trichlorobenzyl chloride or trichlorotoluene gave slightly better control of Echinochloa crusgalli than CDAA alone; CDAA pre-em. + simazine post-em. at the 5-leaf stage gave complete season-long weed control.

2. Pre-em. herbicides for annual weed control in grain sorghum. In trials in Indiana on silt loam soil in dry conditions, 2,4-D propylene glycol butyl ether ester 2 #, amiben 3 #, fenac sodium 1.5 and 3 # and CDAA 4 # pre-em. gave fair to good weed control. The 2,4-D ester and fenac reduced sorghum stands by 20-30%.

3. Pre-em. weed control in grain sorghum. In trials on silt loam soil in which > 3 in. of rain fell in the 2-week period after pre-em. treatment, highest percentages of soil not covered by weeds at 6 weeks after sowing sorghum were as follows: neburon 4 # 83 and 8 # 94, amiben 4 # 83, simazine 1 # 83 and 2 # 88, atrazine 1 # 85 and 2 # 92, trietazine 2 # 84, propazine 2 # 71 and 4 # 75, 2-chloro-4-isopropylamino-6-methylamino-s-triazine 2 # 86. Cyperus esculentus was not adequately controlled by any treatment. Significant sorghum stand reductions followed treatment with neburon 4 and 8 #, CDAA 4 #, amiben 3 and 4 #, simazine 1 and 2 #, atrazine 2 # and trietazine 2 #.

4. Effect of foliage applications of herbicides to RS 610 sorghum. In trials in Texas on silty clay loam in which irrigated weed-free sorghum was sprayed when 14 in. high, the following treatments did not result in yields below those of untreated controls 2,4-D butoxyethanol ester 0.5 #, amitrole 0.5, 2 and 4 #, amitrole T (amitrole + NH_4 SCN) 0.5 and 1 #, fenac sodium salt 0.5 #, 2,4,5-TP propylene glycol butylether ester 0.5 # and propazine 1 and 2 #. Amitrole turned the crop white. - P.J.B. [O.W.]

1015. KAYUMOV, G. and NAVRUZOV, N. [The influence of flooding depth on the number of weeds in rice.] Sel'sk. Khozyajstvo Tadzhikistana, 1960, (7), 40-1.

Increasing the depth of water in a rice plantation from 5 to 25 cm caused weeds to decrease from 81 to 8/m^2, and the rice yield to fall from 99 to 18 centners/ha. From Ref. Zh. (Biol), 1961, (7), 7 G733. - K.A.B.

1016. GOMES, A.G., BARONI, O., BARBOZA, O.G. and COELHO, A.L. (Inst. Agron. Est., S. Paulo, Brazil). Contribuicao para o estudo de aplicacao de herbicidas na cultura de arroz novale do Paraiba. [Contribution to the study of herbicide application in rice in the Paraiba Valley.] An. Semin. Braz. de Herbicidas e Ervas Daninhas 1958, 1959, 47-55, (Portuguese), bibl. 2.

The commonest weeds in direct-sown and transplanted rice are named; these include red and black rice which are a serious problem, and against which 2 4-D (amine) pre- or post-em. was ineffective for selective control. In transplanted rice 2,4-D (amine) 0.4, 0.75 and 1.05 ml/m^2 in 1 l/10 m^2 water, applied 20 days after transplanting, gave good weed control at the higher rates when the irrigation water was withdrawn, but not otherwise. In pre-em. trials in direct-sown rice, monuron, dalapon and TCA were toxic to rice at rates required to control weeds and 2,4-D was unsatisfactory. Good weed control without injury to rice was

obtained with dinoseb (alkanolamine) both as Premerge (53% a.e.) at 3 ml/m^2 and as Carpinox D (80% in diesel oil) which at 20 ml/m^2 gave excellent control of Brachiaria plantaginea.

Carpinox D at 20 ml/m^2 resulted in much higher rice yields when applied twice - first to the germinating weeds and again after sowing the rice (which should be done as soon as new weeds begin to germinate) than when applied once only after sowing the rice over the germinated weeds. - D.H.L.S. [O.W.]

1017. UNITED STATES AND CANADA. Soybeans [8 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 84-6.

1. Comparison of granular and liquid formulations of herbicides on soybeans. In trials in Ohio, soybeans were sown on 6th May or 3rd June on silty clay loam. 3.88 in. rainfall fell in 3 weeks after 6th May and 0.87 in. in 3 weeks after 3rd June. On 7th July, plots sown on 6th May and treated pre-em. with NPA 2 # + chlorpropham 2 # liquid and amiben liquid or granular at 2 or 4 # showed 90% or more reduction in weed stands. Crops treated with NPA + chlorpropham showed transient injury. Treatment of plots sown on 3rd June with chlorpropham liquid or granular 8 # or amiben granular 4 # reduced weed stands by 60-69%, the reduced efficiency being the result of dry conditions.

2. Effectiveness of amiben for controlling weeds in soybeans. In trials in Minnesota on silt loam soil, amiben was applied pre-em. at 2, 4, 6 or 8 # 1 day after sowing soybeans. Weed control was evaluated 30 days later. Control of broad-leaf weeds (including Amaranthus retroflexus, Chenopodium album, Polygonum persicaria and Ambrosia artemisiifolia) was 85, 90, 95 and 95% for the 2, 4, 6 and 8 # rates, respectively, while control of Echinochloa crusgalli and Setaria spp. was 55, 70, 80 and 85%. Granular and liquid formulations were equally effective. The 6 and 8 # rates of amiben caused slight stunting in the soybeans.

3. Pre-em. weed control in soybeans at Poneta, Indiana. In trials on silt loam soil, amiben and CDAA in 40 gal water were applied at the beginning of soybean emergence (25th May) and assessments of weed growth made on 10th July. Amiben 3, 4 or 8 # gave 90-100% control of annual broad-leaved and grass weeds. CDAA 6 # gave 90-95% control of grasses, but was less effective against broad-leaved weeds. Amiben 8 # caused slight transient growth retardation in the crop.

4. Control of weeds in soybeans with pre-em. herbicides. In trials with a number of herbicides applied pre-em. to soybeans on silt loam soils at Lexington (L) and Henderson (H), Kentucky, the following gave the best control of annual broad-leaved and grass weeds (assessments made in mid July): amiben 6 # at (L) gave 91% control and at (H) 4 # gave 87% control, PCP 20, 25 and 30 # at (L) gave 94, 80 and 92% control, respectively, and at (H) 25 # gave 83% control, at (L) prometone (2-methoxy-4,6-bis(isopropylamino)-s-triazine) gave 93, 95 and 99% control, respectively. Treatments causing crop injury were prometone (severe at the highest rate used) and amiben 4 # at (H).

5. Evaluation of pre-em. herbicides for weed control in soybeans. In trials on silt loam soil, the following herbicides were applied pre-em.: PCP sodium salt 20 #, CDAA 4 #, NPA 4 #, simetone (2-methoxy-4,6-bis(ethylamino)-s-triazine) and trietazine 2, 4 and 6 # and amiben 6 # liquid and 4 # granular. The most satisfactory treatments were amiben granular 4 # and PCP 20 #; these gave weed control for 6-8 weeks with no crop injury. Weed control where amiben liquid 6 # and NPA were applied was excellent, but the crop was stunted. Trietazine caused severe crop injury and simetone and CDAA failed to control weeds.

6. Pre-em. treatments for annual weed control in soybeans. In trials in Indiana, herbicides were applied pre-em. on 2nd June to soybeans in relatively dry conditions. CDAA 4 #, dimethyl 2,3,5,6-tetrachloroterephthalate (Dacthal) 4 and 8 #, O-2,4-dichlorophenyl-O-methylisopropylphosphoramidothioate (Zytron) 10 #, NPA sodium granular 4 #, NPA sodium 2 and 3 # + chlorpropham 2 and 3 # and amiben triethylamine salt 3 and 4 # all gave fair to good weed control, with no crop injury.

7. Effect of chlorpropham + NPA on 10 soybean varieties. In trials in Ohio on silty clay loam, chlorpropham 4 # + NPA 2 # were applied 1 day after sowing soybeans. Within 6 hours of treatment, 1.25 in. rainfall fell. Emergence of soybeans from treated plots was in many cases slower than that from untreated controls and the average yield from the former was 3.8 bu/ac lower than that of controls. There were no significant variety x treatment interactions.

8. Herbicides for weed control in soybeans. The results are reported of trials at Hoytville (H), Wooster (W) and Columbus (C), Ohio in which herbicides were applied to soybeans pre-em., at the cotyledon and at

the first trifoliate leaf stages. Amiben pre-em. at 3 and 4 ℔ at (H) and (W) gave 90% or more reduction of all weeds except Polygonum persicaria (reduced 75-90%). Dinoseb at the cotyledon stage reduced weed stands by 80% or more at (C) and (H) and by 95% or more at (W). NPA 3 ℔ + chlorpropham 3 ℔ at the cotyledon stage reduced weed stands by 90% or more at all locations. No pre-em. treatment injured the soybeans. P.J.B. [O.W.]

1018. STANIFORTH, D.W., SYLWESTER, E.P., WEBER, C.R., and LOVELY, W.G. (State Univ., Ames, Iowa, U.S.A.). Weed control in soybeans. Pamph. Iowa State Univ. Ext. Serv., 1960, 270, pp.4.

Recommendations for cultural and herbicidal control. Under Iowa conditions, NPA, CDAA, dinoseb and PCP used pre-em. have given best results. Amiben 4 ℔ pre-em. has caused no injury in 2 years testing but is still in the experimental stage and to be effective requires rain to fall after application. D.M.L.S. [46(77.7)]

1019. DE CARVALHO, L.R. and AMARAL, J.K.DO. (Secretaria da Agric., Porto Alegre, Rio Grande do Sul, Brazil). Emprego de herbicidas na cultura da batatinha. [Use of herbicides in potatoes]. An. Semin. Brasil de Herbicidas Ervas Daninhas 1958, 1959, 21-8, (Portuguese), tabs.2, bibl.7.

Applied pre-em. 6 days after planting (var. Eigenheimer), none of the following caused injury to potatoes: (1) Mixture of dinoseb (alkanolamine) (as Premerge) 3.6 kg/ha and TCA 13.5 kg/ha, (2) Carpinox (fortified dinitro-based oil) 10 l/ha, (3) TCA 13.5 kg/ha, (4) diuron 1.2 kg/ha, (5) mixture of Carpinox and TCA 9 kg/ha. (4) and (1) gave the best yields and weed control. The predominant weeds were Amaranthus spp., Portulaca oleracea, Cynodon dactylon, Digitaria sanguinalis and Ipomoea sp. - D.M.L.S. [O.W.]

1020. DIXIERAS, J. and BOUCHET, J. (Inspecteur de la Protection des Vegetaux, Angers, Maine et Loire, France). Un parasite du chauvre - l'orobanche. [A parasite of flax - broomrape]. Phytoma, 1960, 117, 39-44, (illus.), (F.), figs.1, tabs.1.

The problem of Phelipaea ramosa [= Orobanche ramosa] infestations in the flax-growing region of France is discussed and the parasite is described and illustrated. In a preliminary trial in 1959 the following were applied: (1) 10-28 days before sowing flax: DD (dichloropropane/dichloropropene) 400 and 600 l/ha, dibromoethane 90 kg/ha, SMDC 327 and 163.5 l/ha, simazine, atrazine and methoxy-propazine each at 1 and 2 kg/ha, diuron 1.6 and 3.2 kg/ha, EPTC 7.88 l/ha, mecoprop 2.5 l/ha, 2,3,6-TBA 4 kg/ha; (2) at sowing silicate of methoxyethyl mercury 2.250 kg/ha (of mercury); and (3) at the first emergence of broomrape with a second application 5, 12 or 22 days later, 2,4-D (butyl glycol ester) 800 + 800 g/ha, 600 + 600 g/ha and 800 + 400 g/ha. The three 2,4-D treatments, DD and SMDC gave some control but the 2 latter are not practicable and control from 2,4-D was not complete; also its use, though easy enough in flax grain crops, is difficult in fibre flax crops which are sown at a density of 100-150 plants/m^2. - D.M.L.S. [O.W.]

1021. MONOV, A.I. [The time of treatment of fibre-flax (Linum usitatissimum var. elongata) with herbicides]. Dokl. Mosk. S.-Kh. Akad. im. K.A. Timiryazeva, 1959, No.47, 139-45.

The best time to apply Na MCPA to fibre-flax was when the plants were 12-15 cm high. Earlier treatment caused severe depression of growth, while later treatment did not control weeds satisfactorily. From Ref. Zh. (Biol.), 1961, (1), 1 G832. - K.A.B.

1022. KOSTENKO, I.R., MELESHKO, I.I., KULIKOVA, M.V., MATUEVA, G.N., POPOV, N.I. ZAKIROV, T.S. and KANASH, M.S. The technical and economic effectiveness of cotton defoliants. Khlopkovodstvo, 1960, 8, 29-36, (Russ.), tabs.5.

Presents data from tests with a number of defoliants at 6 State farms in Uzbekistan in 1959. $CaCN_2$ 40 kg + 15 kg Na_2SiF_6/ha, is effective in areas with plentiful dew. Mg $(ClO_3)_2$ was suited to all regions of Uzbekistan, but particularly to those without dew; 12 kg/ha is recommended. On very leafy, full-grown cotton plants, a 6-8% solution in 150-200 l water/ha was best. On half-grown and young plants requiring repeated cultivation, a 12% solution in 100 l water/ha, applied in the second half of September, is advised. Chlorate - chloride of calcium is suitable for all regions, particularly those without dew, where dusted $CaCN_2$ gives unreliable results. Further tests on optimum dosage will be made but 25-30 kg in 200 l water /ha is suggested. Data on cost/ha and number of ha treated per aircraft flight, are tabulated for 1 farm. Chlorate-chloride of calcium was the most economical. - K.A.B. [G.R.I.]

1023. BAUSOVA, A.S. [Defoliation and desiccation of fine-fibred cotton varieties in Turkmen S.S.R.] Khlopkovodstvo, 1960, 9,23-26,(Russ.),tabs.2.
Two-year tests with various compounds on var. 5476-I, and 1-year tests on var. 8763-I and 5904-I showed that the best and most reliable defoliant was $Mg(ClO_3)_2$. Spraying before at least 3-4 bolls were open reduced cotton yield. Dosage should not at first exceed 10 kg/ha, increasing to 12-15 kg/ha with falling air temperature. $Mg(ClO_3)_2$ was also the best desiccant, though dosage and period of desiccation need to be determined more exactly. - K.A.B.

1024. ZAKIROV, T.S., ABDULLAEV, K.H. and VASILEVSKII, I.G. [Stem defoliation of cotton]. Khlopkovodstvo, 1960, 9,62-3,(Russ.)
A preliminary report is given of experiments in Uzbekistan in 1959 on the effect of stem defoliation on the rate of opening and yield of cotton. A 0.5% a.i. solution of $Mg(ClO_3)_2$ was applied at 400-450 l solution/ha to the lower 40 cm of stems by means of tractor-mounted sprays. Separate plots were treated on 15th August, 25th August, and 5th September. On 22nd September, normal defoliation treatment was applied to all plots and to an untreated control. The % of leaves on the stem falling after stem treatment increased from the first (15th August) to the last (5th September) date of application; it was >50% in all cases, and reached >65% on individual stems, but in no case did it remove all leaves. No difference in rate of opening of bolls was noted with date of treatment. Twelve days after general defoliation, however, 9.8-10.8% more bolls had opened on stem-treated plants than on controls. Boll weight was not reduced by stem treatment. K.A.B. [G.R.I.]

1025. FATUS, G.K., MATVEENKO, T.M. and VOVNJANKOV, M.T. The use of herbicides for weed control. Tobak, 1960, 21,(4),41-4, (Russ.).
DCU, propham, sodium TCA, 2,4-D sodium salt and MCPA sodium salt were used in several trials for weed control in frame-grown tobacco seedlings. The most effective control on both grassy and broad-leaved weeds was obtained with DCU 10 g + 2,4-D 3 g or DCU 10 g + MCPA 3 g/m^3 of soil, applied 3 days before sowing. Seedling stands were greatly improved and when these herbicides were combined with DNOC at 30 g, chlamydospores of black root rot were also destroyed. The herbicides did not affect soil structure and they were considered better and cheaper than soil sterilization. From Hort.Abstr. 31:2674. - P.J.B.

1026. GREEN, R.J. and ERICKSON, S.T. Mint farming. Agric.Inf.Bull.U.S.Dep. Agric., 1960, 212,pp.26.
Includes recommendations for weed control. P.J.B.

1027. UNITED STATES AND CANADA. Weed control in biennial and perennial legumes [7 reports]. Res.Rep.Joint 16th N.Central and W.Canadian Weed Control Conf., 1959, 92-4.
1. Evaluation of amiben in pre-sowing incorporation and pre-em. applications to legumes. In trials in Minnesota on silt loam soil, amiben 2, 4 and 6 # pre-sowing and 1, 2 and 4 # pre-em. was applied, to lucerne, birdsfoot trefoil, red clover, alsike clover and yellow sweet clover. Control of Echinochloa crusgalli, Amaranthus retroflexus, Polygonum persicaria and Setaria spp. was excellent for all treatments, though pre-sowing treatments were less effective (83% control) than pre-em. treatments (95%) for the 2 # rate. Pre-sowing treatments with 2 # and pre-em. treatment with 1 and 2 # markedly reduced the stands of all legumes except yellow sweet clover. Lucerne and red clover were particularly susceptible. Birdsfoot trefoil and alsike clover both had a measure of tolerance to amiben and recovered later in the season after treatment with 1 and 2 #.
2. Effect of herbicides on lucerne and sweet clover seedlings. Wheat undersown with legumes was treated with 2,4-D and MCPA diethanolamine salt 0.25, 0.375 and 0.5 #, 2,4-DB and MCPB sodium salts and butyl esters and MCPB 1, 1.25 and 1.5 #. [Stage of growth at treatment not stated]. Only in the case of sweet clover did the treatments reduce fodder yields below those of controls. At these rates, phenoxybutyric formulations were not superior to phenoxyacetic formulations.
3. Formulations of phenoxyacetic and phenoxybutyric acids used on legumes and assessed the year after spraying. In trials in Alberta in 1958, 2,4-DB and MCPB sodium salt and butyl ester formulations at 1, 1.25 and 1.5 #, and mixed amines of 2,4-D and MCPA diethanolamine salt, each at 0.25, 0.375 and 0.5 # were applied to lucerne, sweet clover, alsike clover and red clover at the 3-5 true leaf stage. With lucerne, all treatments resulted in

excellent control of light weed infestations. 2,4-DB ester resulted in the highest forage yields in 1959 and mean yields for all treatments were 400 # greater than those of untreated controls, where no companion crop was used. With sweet clover, 2,4-DB and MCPB butyl esters caused severe damage. MCPA diethanolamine salt 0.25 and 0.375 # gave satisfactory weed control and large yield increases over controls. Results with red clover were similar to, but not so pronounced as, those with sweet clover. With alsike clover all treatments, except 2,4-DB butyl ester, increased forage yields.

4. Effect of pre- and post-em. herbicides for weed control in lucerne sown in spring and autumn. In trials in Kentucky, lucerne was sown on 3rd September 1958, on one set of plots and on 7th April 1959, on another set. The following herbicides were applied: EPTC 3, 6 and 9 # pre-sowing (incorporated) and pre-em. (surface application), 2,4-DB mixed esters 1 #, dalapon 3 # and 2,4-DB + dalapon, each applied 10-14 days after emergence. In plots treated in autumn, no EPTC treatment increased stands, while 2,4-DB and dalapon or 2,4-DB + dalapon resulted in highly significant stand increases. All treatments, except EPTC 3 # pre-em., resulted in highly significant weed stand reductions. On spring-treated plots, no treatment resulted in significant differences in lucerne stands. The size of lucerne seedlings was significantly increased by EPTC 3 # pre-sowing and by all rates pre-em. Weed numbers were significantly reduced by all EPTC treatments, except 3 # pre-em., and, of the post-em. treatments, only by 2,4-DB 1 # + dalapon 3 # (highly significantly). Data are given of hay yields.

5. Pre- and post-em. herbicides for weed control in lucerne. In trials in Missouri, the following treatments were made to lucerne sown on 13th April, 1959: pre-sowing EPTC liquid and granular 1, 2 and 3 #, disced in; pre-em. neburon 1 and 2 # and EPTC liquid 15 #; post-em. 2,4-DB 0.5 and 1 #, 2,4-DB 1 # + dalapon 2 # (lucerne 3-4 in. tall) and 2,4-DB (lucerne 4 in. tall), followed by dalapon 2 # after the first cut. EPTC 15 # pre-em. gave the best weed control and kept plots nearly free from weed grasses all summer. Broad-leaved weeds were controlled until the lucerne had formed a closed canopy. EPTC 2 and 3 # pre-sowing was slightly less effective than 15 # pre-em. Granular EPTC was approx. equal to liquid EPTC in effect. Neburon 1 and 2 # pre-sowing was equal to EPTC 2 and 3 # and resulted in slightly taller lucerne crops. 2,4-DB gave good control of broad-leaved weeds. All post-em. treatments caused some injury to the lucerne.

6. Pre- and post-em. treatments for weed control in red clover and birdsfoot trefoil. In trials in Missouri, the following were applied: EPTC 15 # pre-em., EPTC 1, 2 and 3 # liquid or granular disced-in pre-sowing, and EPTC 1 and 2 # disced-in pre-sowing, followed by 2,4-DB amine salt 0.5 #. Post-em. treatments included 2,4-DB and 2,4-DB + dalapon. Red clover, but not birdsfoot trefoil, showed severe stunting after all EPTC treatments. EPTC 1 # pre-sowing controlled Digitaria sp. for about 8 weeks. In birdsfoot trefoil, 2,4-DB + dalapon was somewhat more effective against weeds than EPTC and excellent control of grasses was secured by applying 2,4-DB 1 # + dalapon 3 # (crop 0.5-2 in. tall), followed by applying dalapon in mid-summer.

7. Pre-sowing and pre-em. treatment with EPTC for annual grass control in spring-sown lucerne. In trials in Oklahoma, EPTC 2,44 and 8 # liquid and granular was applied pre-sowing and incorporated and as a liquid, pre-em. No treatment affected lucerne emergence, but the 8 # rate caused some growth retardation later. All treatments controlled Digitaria sp. for 3 weeks after emergence, until heavy rains supervened. - P.J.B. [O.W.]

1028. LARREA ALBAN, C.F. (Palmira Exp.Sta., Colombia). Represion de malezas en alfalfa (Medicago sativa L.). [Weed control in lucerne (M. sativa L.).] Acta agron.(Palmira), 1959, 9,(3/4),113-51,(Span.e.), figs.11,tabs.9, bibl.19.

Detailed results (in yield of lucerne var. Paraman and dry weight of weeds) are given of (A) box trials in which dinoseb 2, 4 and 6 (all rates are in kg/ha), dalapon 3, 6 and 9, CDEC 1.83, 2.78, and 3.71, CDAA 0.95, 1.90, and 2.85, TCA (sodium) 1.80, 3.60 and 5.40 and 2,4-DB (amine) 0.96, 1.92 and 2.88 were applied (1) pre-em. or (2) post-em. (4-6 leaf stage); and (B) field experiments in which the dtreatments were: (1) dinoseb and dalapon alone and in mixtures pre-em. and in various combinations with post-em. and post-cutting applications and (2) dinoseb 8 pre-sowing, 4 pre-em., and 4 post-em, and the following pre-em.: CDEC 1.86 and 2.78, CDAA 1.90 and 2.85, 2,4-DB 1.92 and 2.88, TCA (sodium) 3.60, dinoseb 4 + dalapon 3, and 2,4-DB 1.92 + dalapon 3. In addition, in experiment B(1) the value of cutting lucerne in the seedling stage as a means of controlling weeds was compared with herbicidal treatments.

Dinoseb, though in the box trials it reduced

germination pre-em. and was injurious post-em., caused no adverse effect in the field trials either at 4 pre-em. or at 2.5 post-em.; at 8 pre-sowing, however, it greatly reduced germination and at 4 post-em. it reduced the yield. Dalapon 3-9 was injurious in the box trials both pre- and post-em. and also in the field at 6 pre-em. and 5 post-em. When mixed with dinoseb it appeared to be less toxic and when applied pre-em. at 6 + dinoseb 4 caused no adverse effect, gave good weed control and resulted in increased yield; post-em. at 5 + dinoseb 2.5, it caused only temporary injury and yield was not greatly affected.

CDEC and the lower rates of CDAA caused no appreciable adverse effects, either pre- or post-em, but in the pre-em. field trial, CDAA 2.85 caused toxic effects and reduced the yield; TCA 3.60 likewise greatly reduced the yield, whereas 2,4-DB 1.92 and 2.88 resulted in the highest yields of the chemical treatments.

Weed control. Cutting the lucerne in the seedling stage caused greater damage to the crop (whether sprayed with a herbicide or not) than to the weeds. Dinoseb 4 pre-em. controlled all weeds except [Eleusine indica], Cynodon dactylon], [Cyperus rotundus] and [Portulaca oleracea] for about 6 weeks and when followed by dinoseb 2.5 + dalapon 5 post-em., inhibited the germination of most weeds (excepting the above) until the first cut. Likewise a post-cut application of dinoseb/dalapon mixture kept the weeds well controlled. Once the lucerne became well established, it recuperated rapidly after cutting and competed strongly with the weeds. D.M.L.S. [C.A.]

1029. BOURGN, H. and POIGNANT, P. Echelle de sensibilite des mauvaises herbes les plus communes des terres de grande culture et des herbages aux principaux desherbants selectifs. [Table of susceptibility of the commonest weeds in field crops and grasslands to the principal selective herbicides]. Phytoma, 1960, 115,9-16,(F.),tabs.2.

Two tables are included giving the susceptibility of: (1) 61 common weeds of field crops to MCPA 750-1800 g/ha, 2,4-D amines 500-800 g/ha and esters 350-600 g/ha, MCPB 1700-2300 g/ha, mecoprop 1700-2300 g/ha and DNOC 2500-5000g/ha; and (2) 51 common grassland weeds to MCPA 1800-2200 g/ha, 2,4-D (amine) 800-1200 g/ha, and 2,4-D (ester) 600-900 g/ha. Both common and botanical names are given. - D.M.L.S. [O.W.]

1030. POPOVA, A.Ya. (Crimean Pedagogic Inst.). Centaurea diffusa Lam., a steppe-pasture weed in the Crimea. Bot.Zh.,SSSR, 1960, 45,(8),1207-13,(Russ.),bibl.13.

It is calculated that C. diffusa (usually a biennial) constituted 40-65% of the dry matter harvested from lucerne crops in the Crimea. Mechanical methods of control are unsatisfactory. 2,4-D at 1 kg/ha gives effective control of C. diffusa in mixed swards, but reduces the proportion of legumes in the herbage. - From Herb.Abstr.31:707. P.J.B. [G.R.I.]

1031. BENAS, G. and ROLLANDIN, E. Un essai de desherbage chimique des patures dans le Boischaut Sud. [A chemical weed control trial in the pastures of the Boischaut Sud]. Phytoma, 1959, 108,27-9, (illus.),(F.).

Describes briefly, a trial in which a mixture of the alkylcyclohexanol esters of 2,4-D and 2,4,5-T was used successfully to kill mixed brush prior to pasture renovation at a total cost of 4000 francs/ha. D.M.L.S. [O.W.]

1032. PHYTOMA. Desherbage et debrousaillage des prairies et paturages. La journee d'etudes et d'informations d'Annecy. [Weed and brush control in hayfields and pastures. Day of study and information at Annecy]. Phytoma, 1961, 124,24-31,(illus.),(F.).

The talks and papers read are briefly summarized. The following information from a report by Hudault and Authosserre is included: 2,4-D ethyl ester in oil at 1.5 kg/ha gives excellent control of "Veratres" [Veratrum sp.] if applied before appearance of the flower stalk. High rates of 2,4-D butyl-glycol ester, alone or in mixture with 2,4,5-T amyl ester, has given good results on Rhododendron spp., "green alder" [Alnus sp.], Calluna sp., and "myrtilles" [Vaccinium myrtillus]; climbing juniper [Juniperus sp.] is, however, resistant. - D.M.L.S. [O.W.]

1033. NEW ZEALAND, SERVICE. They have brought it back alive. Service, 1961, 5, (4),4-7,(illus.).

An account, with costs, of the restoration to pasture of about 5000 ac of hill country covered with manuka bush, secondary growth and gorse. Brush control was effected by slashing, burning and aerial spraying with 2,4,5-T. - D.M.L.S. [O.W.]

1034. McCALEB, J.E., HODGES, E.M. and DANTZMAN, C.L. (Range Cattle Exp.Sta., Ona, Florida). Effect of herbicidal control of saw palmetto on associated native forage plants in peninsular Florida. J.Range Mgmt, 1961, 14,(3),126-30,tabs.4,bibl.7.
In September and October, 1957, saw palmetto (Serenoa repens) in cut-over pine lands in Florida was treated with dalapon 20 #, 2,4,5-T 4 #, 2,4,5-TP 4 #, 2,4-D 2 # and erbon 120 # applied in 60 gal spray in water or in carriers containing 50 or 100% diesel oil. The % species composition and ground cover were determined in May, 1959, about 20 months after treatment. Erbon in water resulted in the greatest reduction in S. repens (86% kill), followed by dalapon in 50% diesel oil (83% kill) and 2,4,5-T in water (75% kill). Data are given of changes in grass, grass-like plants and forbs following treatment. There was an increase in the density of forage plants in all cases except where erbon in 50 and 100% diesel oil was applied. Plots treated with 2,4,5-TP showed the greatest increases in the density of grasses and grass-like plants. The use of oil in the carrier increased the % of desirable grasses in all cases. P.J.B. [O.W.]

1035. CABLE, D.R. and TSCHIRLEY, F.H. (Rocky Mt.For.and Range Exp.Sta. Fort Collins,Colorado). Responses of native and introduced grasses following aerial spraying of velvet mesquite in southern Arizona. J.Range Mgmt, 1961, 14,(3),155-9, figs.2,tabs.2,bibl.5.
In trials on the Santa Rita Experimental Range, near Tucson, Arizona (alt. 4000 ft; average rainfall about 16 in. p.a.), plots with stands of about 225 velvet mesquite (Prosopis juliflora var. velutina)/ac were sprayed in May, 1954, with 2,4,5-T esters at 0.75 # a.e. in a 1:4 diesel oil-water emulsion applied at 5 gal/ac from the air. At the same time, the whole trial area was sown from the air with Eragrostis lehmanniana at 1 #. In June 1955, half the area treated in 1954 was again sprayed from the air with 2,4,5-T esters at 0.5 # and the other half with 2,4,5-T at 0.75 #. The total cost of the two sprayings + sowing from the air was $9.50 for the 0.75 + 0.75 # herbicidal rates and $8.90 for the 0.75 + 0.5 # rates. In the autumn of 1959, 5 growing seasons after the second spraying, the mortality of velvet mesquite was only 2% for areas sprayed once, but 36 and 58%, respectively, for areas treated a second time with the 0.5 and 0.75 # rates, and defoliation was 17, 86 and 95%. Herbage production from native perennial grasses was almost twice as high on sprayed (twice) as on unsprayed plots and yield of E. lehmanniana was more than trebled. The cost of spraying twice was more than paid for by the resultant increased forage yield during the first 3 years. The rate of recovery of velvet mesquite was very slow. - P.J.B. [O.W.]

1036. AMARAL, J.K.DO and CARVALHO, L.R. (Segretaria de Agricultura, Porto Alegre,Rio Grande do Sul,Brasil). O controle do gravata (Eryngium sp.) em pastagens nativas (Nota previa). [The control of thistle (Eryngium spp.) in native pastures. (Preliminary note)]. An.Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 191-5,(Portuguese).
2,4,5-T isopropyl ester 2# gave better results than 2# 2,4-D ester or a mixture of the two, but some regrowth occurred. - D.M.L.S. [O.W.]

1037. HIGGINS, R.E. and TORELL, P.J. (Agric. Coll.,Univ.Idaho,U.S.A.). Medusahead (Elymus caput-medusae). Range menace. Ext.Bull. Idaho,Agric.Coll., 1960, 331,pp.4.
No practical method of controlling large stands of E. caput medusae is available. Temporary (1 year) control can be obtained by mouldboard or disc ploughing, or by applying dalapon 2 # from mid-April to mid-May. All these treatments are more effective if E. caput medusae litter is first removed by burning. However, unless a forage sp. can be established to compete, reinfestation occurs rapidly. For local infestations, diuron 20 # will eradicate the weed, but it is expensive and sterilizes the soil for a long period. D.M.L.S. [17(79.6)]

1038. FORSTER, R. (Inst.Agron.Estado de Sao Paulo-Campinas,S.P.,Brazil). Acao seletiva do dalapon em prado de leguminosa kudzu (Nota Previa). [Selective action of dalapon on pastures of the legume Kudzu. (Preliminary note)]. An.Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 37-8,(Portuguese).
Dalapon (85% 2 g/m^2, in 1 dose or in split doses with an interval of 15 days, applied to Kudzu (Pueraria thunbergiana) when leaves were fully grown, controlled Pennisetum purpureum, without adversely affecting the crop. 1 g/m^2 was less effective. - D.M.L.S. [O.W.]

1039. GUAZZALLI, R.J. (Sub-Estacao Experimental de Uberlandia,Minas Gerais,Brazil).

Teste de herbicida em mucuna preta. [Tests of herbicides in black mucuna]. An.Semin. Brazil Herbicidas Ervas Daninhas 1958, 1959, 57-8,(Portuguese).

TCA sodium 10, 20 and 30 kg/ha (salt equivalent) applied when mucuna was 10-15 cm high and grasses 1-5 cm gave good control of grasses, mainly Brachiaria plantaginea and Cenchrus sp. at all rates. Mucuna was seriously injured by the 2 higher rates and its growth badly checked by 10 kg/ha. D.M.L.S. [O.W.]

HORTICULTURAL, ORNAMENTAL AND PLANTATION CROPS

1040. UNITED STATES AND CANADA. Weed control in vegetable crops [15 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1958,97-101.

1. Potatoes. In trials in Manitoba, the following herbicides were applied in 15 gal water several days before emergence of potatoes: TCA, dalapon, neburon, diuron, trietazine, TCA + dinoseb and dalapon + dinoseb. TCA 3 # + dinoseb 1 # and dalapon 1.5 # + dinoseb 1 # gave considerably better weed control than the other treatments. No treatment significantly reduced tuber yields. In trials in Minnesota on peat soil, potatoes planted on 5th May were sprayed pre-em. on 21st May. The soil was wet at the time of treatment and 0.56 in. of rain fell during the subsequent week. The following gave commercially acceptable weed control: monuron 1.6 and 2.4 #, simazine 2 and 4 #, 2,4-D alkanolamine salts 2 # and 2,4-D 2 # + TCA 10 #. Only simazine 4 # injured the crop and reduced tuber yields. Weeds present were mostly Amaranthus sp. and Setaria sp.

2. Carrots. In trials in Wisconsin on organic soil, carrots were sown on 27th May and herbicides applied post-em. on 10th June when the carrots were 1.5 in. tall and weeds (mainly Amaranthus retroflexus and Datura stramonium) were 4 in. tall. Weed control percentages were: atrazine 4 # 100, trietazine 4 # 90, Dioryl (N(3,4-dichlorophenyl) methacrylamide) 4 # 90, Stoddard solvent 40 gal/ac + chlorpropham 4 # 75, Karsil (N-(3,4-dichlorophenyl)-2-methylpentanamide) 2 # 65 and amiben 4 # 40. No treatment except atrazine caused crop injury. In similar pre-em. trials, best control of weeds was given by ipazine 2 and 4 # (55 and 60% control), propazine 2 and 4 # 55% control and amiben 2 and 4 # 50% control. In trials in Minnesota, carrots were sown on peat soil on 20th April and sprayed pre-em. on 27th April. Rain (0.8 in.) fell 8 days after spraying. Weed control was assessed 7 weeks after spraying. Ipazine 4 # and amiben 8 # gave 80-90% control of weeds (mostly Amaranthus spp.) with no crop injury. Trietazine 4 # and monuron 1.6 # gave 70% weed control, but injured the carrots. In similar post-em. trials carrots on peat soil were sown on 20th April and treated on 5th May (1 true leaf stage; soil very wet) with amiben or on 21st May (1-2 true leaves; soil very wet) with other herbicides. Amiben 4 and 8 # and propazine 2 and 4 # gave 90-100% control of weeds. All other treatments, which included Stoddard solvent, N-(3-chloro-4-methylphenyl)-2-methylpentanamide, (Solan) N-(3,4-dichlorophenyl)methacrylamide (Dicryl) and N-(3,4-dichlorophenyl)-2-methylpentanamide (Karsil), gave > 60% control of weeds. Amiben 8 # caused slight crop injury.

3. Peas. In trials in Minnesota at 3 locations, herbicides were applied pre-em. not more than 4 days after sowing. At 2 out of 3 locations, 80-100% control of both broad-leaved and grass weeds was secured with amiben 4 # and O-2,4-dichlorophenyl-O-methylisopropylphosphoramidothioate (Tytron). CDAA 4 #, solventless CDAA 4 # and CDAA 2 # + monuron 1 # gave 80-100% control of grass weeds. Trietazine 4 # gave 90% control of broad-leaved weeds only. Moderate crop injury followed treatment with monuron 2 # and amiben 4 # at 1 out of 3 locations and with EPTC 2 # at all locations. In similar post-em. trials at the same 3 locations, peas were treated when 7-9 nodes were present. At 2 out of 3 locations, no herbicides gave acceptable control of grass weeds, but acceptable control of broad-leaved weeds was given by dinoseb 3 #, trietazine 2 and 4 #, MCPA 0.375 # and MCPA potassium salt 0.375 # + dalapon 0.75 #. No herbicide caused more than slight crop injury.

4. Asparagus. The results of trials with amitrole, amitrole-T (amitrole + NH_4SCN), amitrole + dalapon and 2,3,6-TBA for the control of annual and perennial weeds in old asparagus are given.

5. Onions. In trials on peat soil in Minnesota onions were sown on 20th April and sprayed pre-em. on 27th April. Granular herbicides were also used. Weed control was assessed on 16th June. Weeds were mostly Amaranthus spp. and some annual grasses. Commercially acceptable weed

control was given by the following (liquid): CDAA 2 # + monuron 0.8 #, monuron 1.6 #, simazine 4 and 6 #. Monuron 1.6 # caused moderate crop injury and both rates of simazine killed the crop. Of granular materials, chlorpropham 8 # and CDAA 6 # gave acceptable weed control, with no crop injury; diuron 2 # and simazine 4 # were effective against weeds, but severely injured the crop. In further trials on peat soil with early post-em. treatments applied at the 1 true leaf stage of onions on very wet soil, only 3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propynyl)urea (CP-10543) 1 #, granular diuron 2 # and granular simazine 4 # gave acceptable weed control with little or no crop injury. CP-10543, liquid simazine 2 and 4 #, monuron 0.8 # + CDAA 2 # and chlorpropham 4 # + CDAA 2 # gave acceptable weed control, but caused crop injury. Weeds were mostly Amaranthus spp. In similar late post-em. trials, onions on peat soil were treated at the 6- to 8-leaf stage on plots with weed stands mostly of Amaranthus spp. and Portulaca oleracea. As assessed 3 weeks after treatment, 80-100% control of weeds, with only slight leaf tip burn, was given by CDAA 6 #, chlorpropham 8 #, monuron 1.6 and 2.4 #, and monuron + chlorpropham mixtures, applied as basal sprays in 40 gal water.

6. Red beet. The results are given of trials in Wisconsin on silt loam soil with pre-sowing, pre-em. and post em. applications of TCA, EPTC, CDEC, dalapon, neburon, barban, amiben and endothal.

7. Other vegetable crops. In trials in Minnesota on mineral soil, pre- and post-em. treatments were made to lima beans, snap beans, cucumbers and peas, using a logarithmic sprayer with mustard and millet sown as simulated weeds. Of pre-em. treatments, the following were the most promising: for lima and snap beans trietazine 2-2.5 #, amiben 2-5 #, Zytron 4-8 # and dimethyl 2,3,5,6-tetrachloroterephthalate (Dacthal) 3-5 #, for cucumbers amiben 2-3.5 #, Zytron 4-5 #, for peas trietazine 2-3 #, Dacthal 2-6 #, amiben 1.5-3 # and Zytron 4-8 #. Post-em. treatments were applied to cucumbers with 1 true leaf, peas with 5 nodes and beans 2 true leaves. The following appeared most promising: for lima beans 2,6-dichlorobenzonitrile 2.5-4 #, for cucumbers amiben 2-4 # and Dicryl 1-1.5 #, for peas Solan 0.5-1 and CP-10543 0.5-1 #. In similar trials with red beet, cabbage, carrots and onions on organic soil in Minnesota, the following were most promising among herbicides applied pre-em.: for red beet amiben 3-4 #, for cabbage and carrots amiben 3-6 # and 2-methoxy-3,6-dichlorobenzoic acid (Velsicol B) 1-3 #. The following were the most promising among post-em. treatments: for red beet none, for cabbage amiben 1.5-3.5 # and 2,6-dichlorobenzonitrile 3-4 #, for carrots propazine 2-4 #, amiben 2-4 #, CP-10543 1-5 #, Dicryl 1-3 # and Solan 2-4 #, for onions trietazine and propazine 2-3 #, amiben 1.5-4 #, 2,6-dichlorobenzonitrile 3-4 # and Zytron 8-10 #. - P.J.B. [O.W.]

1041. SCHRADER, O.L. O emprego do oleo como herbicida na cultura da cenoura (Daucus carota L.) [The use of oil as a herbicide in carrots]. An.Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 103-108, (Portuguese), tabs.7, bibl.13.

In a trial where various oils, pure and in mixtures, were compared, 1:3 and 3:1 mixtures of Varsol and kerosene gave 100% control (the main weeds were Digitaria sanguinalis, Portulaca oleracea and Eleusine indica) and, with pure Varsol, the highest yield of carrots. Good yield increases were also obtained with 1:3 mixture of diesel oil and Varsol, Shell weedkiller 10, and a 1:1 Varsol/kerosene mixture. - D.J.L.S. [O.W.]

1042. TALALOV, E.A. [Herbicides for control of weeds in onion and carrot crops.] Zashchita rast.ot vredit.i bolezney, 1960, (2), 23-5.

In trials at the Tashkent Agricultural Institute, good results in control of weeds of onion were obtained by pre-em. treatment with DCU (at 10-15 kg/ha), TCA (15 kg/ha), and diesel oil (300 l/ha), and by post-em. treatment with kerosene (300 l/ha). Against weeds of carrot, the best herbicides were chlorpropham (5 kg/ha pre-em.) and diesel oil (250 l/ha pre-em.). At the 2-4 true-leaf stage, kerosene 300-400 l/ha is recommended. From Ref.Zh.(Biol.), 1961, (1), 1 G831. - K.A.B.

1043. CORRALES, M.,A. Empleo de hierbicidas en el cultivo de ajo. [The use of herbicides in garlic crops.] Inf.mens.La Molina, 1959, 33, (388), 1-9.

Karmex W (80% monuron), Preventol (sodium pentachlorophenate) and Bulpur (KOCN) were each applied at 2 rates at 21 and again at 51 days after emergence of the garlic. Hand-weeding gave the highest yield but was more costly than any of the herbicidal treatments, all of which were economic compared with the unweeded control. From an economic point of view, the two best treatments were Karmex W at 1 kg/ha, or hand weeding, followed by Preventol

10 kg/ha. Karmex W at 2 kg/ha caused some crop injury. From Hort.Abstr. 31:2513. P.J.B.

1044. GUAZZALLI, R.J. (Sub-Estacao Experimental de Uberlandia, Minas Gerais, Brazil). Testes de herbicida em feijao de porco. [Tests of herbicide in pork bean (= jackbean)]. An.Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 59-60, (Portuguese). Jackbeans sprayed at the 3-leaf stage recovered 5 weeks later from injury caused by TCA sodium 10 and 20 kg/ha; injury from 30 and 40 kg/ha was very severe. Grass control was good from 20 kg/ha and partial from 10 kg/ha. - D.M.L.S. [O.W.]

1045. LEES, P.D. Bulbs. Annu.Rep. Rosewarne exp.Hort.Sta. 1959, 1960, 18-25. Weed control. For narcissi, best weed control was given by PCP 5 gal/ac pre-em. + chlorpropham 0.5 gal/ac post-em. - P.J.B.

1046. JEFF, A.E. Anemonies. Annu.Rep. Rosewarne exp.Hort.Sta. 1959, 1960, 7-17. Weed control. Simazine 0.5 # and monuron 1 # gave satisfactory weed control and resulted in highest flower yields. Mulching with black polyethylene film gave complete weed control with no effect on flower production. - P.J.B.

1047. WIDMER, R.E. and STAUFFERR, R.J. (Minnesota Agric.Exp.Sta., St.Paul). Post-planting weed control in garden chrysanthemums, 1958 and 1959. Res.Rep. 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 101.
Chrysanthemums were planted out in June of 1958 and 1959 and treated with a number of liquid and granular herbicides. The sprays were applied with a flat spray nozzle at 30 p.s.i. in 120 gal water/ac. Assessments of weed control and crop injury were made in mid August. In 1958, excellent weed control was obtained with chlorpropham spray and granular at 8 # and ipazine spray 2 #. Good weed control was obtained with diuron 0.4 # + 2,4-DES 3.6 # monuron 0.8 #, chlorpropham 3 # as sprays and by tris(2,4-dichlorophenoxyethyl)phosphite as spray and granular at 6 #. In 1959, fenac 3 and 6 # gave excellent weed control, but injured the crop. Fair weed control was given by the following granular herbicides: chlorpropham 8 #, amiben 6 # and O-2,4-dichlorophenyl-O-methylisopropylphosphoroamidothioate (Zytron) 15 #. - P.J.B. [O.W.]

1048. WOOD, J. and SHEPHERD, F.W. (Kirton Exp.Husbandry Farm-Lincolnshire, England). Herbicides for daffodils and tulips. N.A.A.S.Quart.Rev., 1961, 52, 166-70, tabs.2, bibl.5.
The use of sulphuric acid, vaporizing oil, DNOC, MCPA, 2,4-D, dinoseb, PCP, sodium arsenite, TCA, monuron and chlorpropham is briefly reviewed and the results of 2 trials given. Chlorpropham injured both daffodils and tulips when applied post-em. shortly before flowering, but not at an earlier stage before tulip leaves were unfurled or daffodil leaves had begun to separate. When applied pre-em. or immediately post-em., following PCP pre-em. up to 8 #, good control of annual weeds is obtained from autumn until May or June. D.M.L.S. [O.W.]

1049. THE GROWER. Simazine once a year will keep roses clean. Grower, 1961, 56, (1), 16.
Simazine 1-1.5 # applied in the autumn to cultivated soil 2-3 weeks after budding, with cultivations again in March and April, is recommended to keep roses clean for a year. Spraying as closely as 2 or 3 days after budding had no apparent effect on bud take. Rosa laxa stock appeared to be less tolerant to simazine than R. canina and more tolerant than R. rugosa or R. multiflora. - D.M.L.S. [O.W.]

1050. UNITED STATES AND CANADA. Weed control in turf [7 reports]. Res.Rep. Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 101-3.
1. Effect of fenac foliage spray on creeping red fescue (Festuca rubra) and Ky bluegrass (Poa pratensis) in the field. In trials in Alberta, established plots of each species were sprayed on 11th July with fenac 5, 15 and 30 # sodium salt and acetamide wettable powder formulations in 30 gal water. As assessed visually in late July and August, the acetamide formulation had no effect on red fescue, but the sodium salt at 15 and 30 # caused some burn. Ky bluegrass was rather more sensitive to both herbicides than red fescue. Fenac did not give selective control of Agropyron repens in turf.
2. Nimblewill (Muhlenbergia schreberi). Post-em. treatments of MH 5 and 10 # and O-(2,4-dichlorophenyl)-O-methylisopropylphosphoroamidothioate (Zytron) 10, 15, 20 and 30 # on vermioulite, were made to Ky bluegrass turf containing nimblewill.

MH at both rates damaged both species severely. Zytron 10 and 15 # had little effect on nimblewill; the 15 and 30 # rates varied widely in their effect. The Ky bluegrass was almost unaffected by Zytron.

3. Crabgrass (Digitaria spp.) control. In trials in Indiana, fairway turf was treated on 14th April, 1959, before crabgrass emergence. As assessed on 24th August, chlordane 75 # and arsenates 400-700 # gave excellent crabgrass control. To maintain crabgrass control after applying chlordane 75 #, a follow up treatment with 40 # in the following year was necessary. Dimethyl 2,3,6-tetrachloroterephthalate (Dacthal) 7.5 and 10 # was as effective as chlordane and arsenates. Zytron 10 and 20 #, diphenylacetonitrile and (p-chlorophenyl) phenylacetonitrile at 4, 8 and 12 # were not very effective. In trials in Minnesota, herbicides were applied early pre-em. to mixed Ky bluegrass/Agrostis/Festuca turf. Satisfactory season-long control of Digitaria spp. was given by the following (rates/1000 ft2): Dacthal liquid 52.1 g (93%), lead arsenate dry 20 lb (L-13489) and 167 g (L-09726) (99%), Zytron spray 232.5 g (100%), Zytron granular 208.4 g (97%), lead arsenate + chlordane + fertilizer mixture (PAX) 25 lb (96%), calcium arsenate + fertilizer (FB-1), 35 lb (90%) and calcium arsenate (CC) 12 lb (91%). In similar post-em. trials in predominantly Ky bluegrass turf, the following gave satisfactory control (rates/1000 ft2): disodium monomethylarsonate (DMA) 49.5 g, ammonium methyl arsonate (AMA) 68.2 g, n-butyl 2-propoxybenzoate (U-9613) 160 g + DMA 0.7 g and Zytron 156 g + DMA 49.5 g. The DMA and AMA (alone) treatments were applied 3 times weekly during 21st July - 4th August and the remainder once per week. All these treatments injured the Ky bluegrass, but only where AMA was applied was the injury permanent. Data are given of % control in turf under irrigated and dry conditions. In trials in several States of the USA on the pre-em. use of Zytron for controlling crabgrass in bluegrass turf, rates of 15-20 # either liquid or granular, used in spring prior to crabgrass germination, have consistently given excellent season-long control. Festuca rubra, Agrostis spp. and Trifolium repens have shown slight to severe temporary injury from Zytron, especially with emulsifiable formulations, but Merion and Kentucky bluegrass have shown considerable tolerance. In trials with post-em. applications of Zytron, crabgrass at growth stages up to the early 2-leaf stage (about 0.5 in. tall) has normally been controlled well by rates up to 20 #, either in granular or emulsifiable form. Late summer and early autumn applications of 30-40 # have resulted in the production of non-viable crabgrass seed and excellent control during the following season. Post-em. treatments with 20 # have given excellent control of Cerastium vulgatum and Stellaria media. - P.J.B. [O.W.]

1051. GARDNER, V.R. Dalapon in the apple orchard. Down to Earth, 1961, 17, (1), 15.
In mid-May of 1958, 1959 and 1960, alternate rows of a mature apple orchard in Ottawa County, Michigan, were treated with Dowpon (85% dalapon sodium salt; 74% dalapon a.e.) at 5 lb/100 gal when the sward cover under the trees was 4-6 in. high. About 1-1.25 gal/tree was applied, with the area treated extending outwards well beyond the spread of the tree branches. The treatments virtually stopped the growth of the grasses and effectively prevented further development during the season, but did not kill them. There was no evidence of injury to the tree foliage, fruit set or fruit development. P.J.B. [O.W.]

1052. KURYNDINA, T.I. The use of herbicides in fruit orchards. Bull. nauch-tekn. Inf., Michurinsk, 1959, No.8, 50-5, (Russ.).
The sodium and ammonium salts of TCA at 32 kg/ha, DNOC at 10 kg/ha, MH at 30 kg/ha, 2,4-D at 2 kg/ha and chlorpropham at 16 kg/ha were sprayed round the bases of wild apple seedlings in the nursery and were found not to reduce shoot growth compared with unsprayed controls. In bearing orchards, DNOC, MH, TCA and petroleum oil have given good weed control. From Hort. Abstr. 31:1957. - P.J.B.

1053. KASPIROVA, T.A. [The use of herbicides to control couch grass in orchards.] S.-Kh. Sev. Zap. Zony, 1960, (6), 81-3.
In trials at the Shumary sovkhoz, Leningrad district, applications of the following herbicides were made between rows in a young non-bearing plum orchard (dosages in kg/ha a.i.): Na TCA 30, 60 and 100; chlorpropham 20, 40 and 60; simazine 8, 15, and 20; 2,4,5-T ether ester 10, 20 and 25; Na PCP 25 and 40. Best results were obtained with simazine at 8 kg/ha (killing 75% of couch grass rhizomes) and Na TCA at 30 kg/ha. The remaining

herbicides only partially damaged the couch grass. From Ref.Zh.(Biol.), 1961, (1), 1 G833. - K.A.B.

1054. RENAULD, D. Le desherbage chimique de la vigne, des asperges et des pepinieres par les derives de l'uree (monuron, diuron et neburon). Chemical weed control in vine and asparagus crops and in nurseries with the urea derivatives (monuron, diuron and neburon). Fruits et Prin., 1960, 30, 159-60.
In France, diuron is used in vineyards and for seedling and young asparagus, monuron for asparagus beds in production and neburon for woody-plant nurseries and strawberries. Dalapon is complementary to the urea derivatives and destroys Agropyron repens and annual grasses. From Hort.Abstr.31:1807. - P.J.B.

1055. BEAUCHARD, J. and CLUZEAUD, A. (Controleurs de la Protection des Vegetaux, Gan, Basse Pyrenees, France). Desherbage chimique de la vigne en Bearn. [Chemical weed control in grapevines in Bearn.] Phytoma, 1961, 127, 33-5, (illus.), (F.), tabs. 1.
The results are described of trials in the hot, humid region of Jurancon in the Basses Pyrenees in which the herbicides used were: simazine 2.5 and 5 kg/ha, dalapon 8.5, amitrole 5-20 kg/ha and amitrole-T (amitrole + NH_4SCN) 12.5-36 kg/ha, atrazine 3 and 5.5 kg/ha and atrazine 2.5 and 5 kg/ha + amitrole 2.5 and 5 kg/ha. Applications were made from May to August to the vegetation between the rows. No injury to the vines was reported. The most promising results on the weeds of the region (the most important being Cynodon dactylon, Agropyron repens, Setaria spp. Ranunculus sp., Daucus carota, Potentilla sp., Mentha sp., Convolvulus arvensis and Plantago sp.) were obtained with atrazine 5 kg/ha alone applied from May-June after cultivation or in a 1:1 mixture with amitrole at 2.5 kg/ha, or 5 kg/ha of each applied in spring to actively growing weeds; [Cynodon dactylon] and [Ranunculus sp.] were not completely controlled, however. Panicum [Echinochloa] crusgalli proved susceptible to atrazine, but resistant to simazine, whereas the reverse was true of Digitaria sanguinalis. D.M.L.S. [O.W.]

1056. SHAULIS, N. and CROWE, D. (Dep. Pomol. New York Agric.Exp.Sta., Geneva). Weed control in New York vineyards. Fm Res., N.Y., 1961, 27, (1), 11, tabs. 2.
In trials during 1955-9 on Howard gravelly loam, the following between-row treatments were applied during 4 years to vines: (a) discing to a depth of 2 in. 4 to 6 times per year, from mid-May to mid-August, (b) one annual application of monuron 3.2 # in the latter half of April, (c) mulching with 20 tons of wood chips/ac in 1956, then as (b), (c) weeds clipped to a height of 0.5 in. with a rotobeater 5 times per year during mid-May to mid-August. In all cases oil-dinoseb sprays were applied beneath the vine trellis. Mean grape yields per vine during 1957-9 for treatments (a), (b), (c) and (d) were 14.6, 14.6, 14.3 and 11.4 lb and mean percentages of bare soil were 20, 55, 15 and 5. Data are given of root counts at different depths, which indicated that root numbers were highest (to a depth of 12 in.) in plots receiving no tillage, and that shallow discing to a depth of 2 in. caused little destruction of roots. - P.J.B. [131(74.7)]

1057. LEONARD, O.A. and LIDER, L.A. (Bot.Dep., Univ. California, Davis, U.S.A.). Chemical eradication of unwanted grape roots and rootstocks. Amer.J.Enol.Viticult., 1960, 11, (2), 51-8, bibl. 3.
In trials in California during 1954-9, 2,4-D and (to a lesser extent) 2,4,5-T amine and ester formulations were effective in killing vine rootstocks as foliar, basal and cut-stump treatments, but were hazardous for use in practice. Sodium arsenate AHS, aromatic oil and carbon disulphide were all ineffective. Results with soil fumigants were good and it was concluded that for effective kill of shoots and of a portion of the root system, not less than 6 separate injections of a total of 200 ml D-D (1,3-dichloropropene-1,2-dichloropropane), Telone (1,3-dichloropropane), SMDC or EDB (85% ethylene dibromide) were required. Lateral diffusion of the fumigant was limited and for effective kill, it was necessary that the fumigant should be in contact with the root system. - P.J.B. [219(79.4)]

1058. RODRIGUES, O. (Instituto Agronomico, Campinas, Sao Paulo, Brazil.) Comparisons between treatments with and without herbicides in the orange grove. An. Semin. Brazil Herbicidas Ervas Daninhas 1958, 1959, 83-91, (Portuguese), tabs. 1, bibl. 4.
For 4 consecutive years the yield of oranges, var. Bamlin grafted on var. Caipira, was highest from mulching with dead grass (+ herbicide to kill any weeds which came through) than from any of the following treatments: (1) spraying with

emulsified mineral oil fortified with dinoseb (water 75%, diesel oil 24%, Premerge (dinoseb 53%) 0.7%, emulsifier 0.3%) 4-5 times in the first and second years and on germination of the weeds in the 3rd year (this treatment gave complete weed control); (2) cutting the weeds 2 or 3 times during the rainy season and discing between the rows in the dry season; (3) cutting only 2 or 3 times a year.
D.M.L.S. [O.W.]

1059. BARONI, O. (Elemco S.A., Sao Paulo S.P., Brazil). Cultivo quimico e cultivo mecanico em cultura de cana. [Chemical and mechanical cultivation of sugar cane (Comparison of costs)]. An. Semin. Brasil Herbicidas Ervas Daninhas 1958, 1959, 229-35, (Portuguese).
The cost of using 2,4-D is compared with mechanical cultivation in 2 sugar cane trials and is shown to be economic.
D.M.L.S. [O.W.]

1060. DE SOUZA, H.D. Aspectos economicos da applicacao de herbicidas em cultura de cana de acucar. [Economic aspects of the application of herbicides in sugar-cane]. An. Semin. Brasil Herbicidas Ervas Daninhas 1958, 1959, 237-42, (Portuguese).
The average cost of weed control by means of 3 hoeings + 1 cultivation on 13 sugar cane estates over 4 years is given and is compared with the cost of 2,4-D or MCPA + 3 cultivations between the rows. The latter was shown to be economic. - D.M.L.S. [O.W.]

1061. EDEN, T. The conservation of soil fertility in tropical plantations. Outlook on Agric., 1961, 3, (2), 62-8. figs. 1, bibl. 27.
Among subjects discussed is the role of weeds as natural cover in tea and rubber plantations. - P.J.B. [O.W.]

1062. BURSCHEL, P. and RÖHRIG, E. (Inst. f. Waldbau-Technik der Universität Göttingen, W. Germany). Unkrautbekämpfung in der Forstwirtschaft. [Weed control in forestry practice]. Verlag Paul Parey, 1960, pp. 92, figs. 72.
This handbook is primarily addressed to the practical forester. It opens with a brief review of the significance of weeds in forestry practice and makes the observation that the cost of controlling weeds in forests in Germany amounts to about half the total management costs. As a pre-requisite to the proper use of modern techniques of weed control, the Authors hold as essential the correct recognition of the various weeds in question and, to this end, the major part of the handbook is devoted to brief reviews, with line illustrations, of the characteristics of importance to their recognition and to the biology and control of the more important weeds (both herbaceous and woody) encountered in forestry practice. Further sections review the different herbicides available, their use and chemical, technical and toxicological properties. There is a bibliography of 127 items. - P.J.B. [O.W.]

1063. CERVINKOVA-JERMANOVA, A. Beitrag zur Benutzung von Selektivherbiziden in der Forstwirtschaft. [The use of selective herbicides in forestry]. Ceskoslov. Akad. Zemedel. Ved. Sborn. Lesn., 1960, 6, (5), 387-94, (Czechoslovakian, g.), bibl. 33.
Reports preliminary nursery trials in which simazine sprays (0.4% aqueous suspension) had no detrimental effect on the development of 1- and 2-year-old Pinus sylvestris when applied as an overall spray at 0.6, 0.8 and 1 g/m^2, nor on 2-year-old Picea abies and Tilia sp. when applied between the rows at 1 g/m^2. Sprays were best as pre-em. treatment, or when the weeds were young. With mature weeds, even 1.6 g/m^2 was ineffective. Dry weather reduced the herbicidal effect.
For. Abstr. 22:1754.

1064. FAULKNER, R. and ALDHOUS, J.R. Nursery investigations. Extr. Rep. For. Res. For. Comm Land 1958/59, 1960, 18-32, bibl. 2.
A number of herbicides were tested for their effect on weeds and on conifer seedlings and transplants, but none of them approached the currently used vaporizing oil or white spirit in efficiency or costs. Tests of weed-suppressing mulches of black polythene sheeting, sisalkraft paper and foil were not promising. Good control of weeds in newly planted poplar plantations was obtained with a single application of monuron 4 lb in 100 gal water, with no damage to the poplars. From For. Abstr. 22:1732. - J.W.F.

1065. HODGES, C.S. Effect of soil fumigation in the nursery on growth of loblolly pine seedlings and control of weeds. Tree Plant. Notes, 1960, (42), 23-7, bibl. 12.
The following treatments were tested: (1) methyl bromide (a) at 300 lb under a polythene cover, (b) vaporized and released at 300 lb under polythene covers laid down by an

automatic covering device and (c) as Brozone (50:50 methyl bromide and petroleum carrier) at 175 ℔ injected into the soil and covered with polythene or left uncovered; (2) SIDC (a) at 50 and 100 gal/ac drenched into the soil with 1300 gal water, or (b) at 50 gal/ac drenched into the soil and covered for 2 days with polythene. All treatments except (2a) gave increased seedling growth and reduced weeds, Brozone being regarded as particularly promising since its application is highly mechanized and 6 ac/day can be treated compared with 1 ac by the standard method. In additional tests, EPTC gave very good weed control up to 12 weeks after planting. From For.Abstr.22:1733. - J.W.F.

1066. KLOTZ, K. Lauterung mit Herbiziden in den Buchendickungen des Bayerischen Waldes. [Cleaning with herbicides in the beech thickets of the Bayerischer Wald]. Allg. Forstzeitschr., 1961, 16,(4),69-71, bibl. 1.
Describes trials with Tormona 100 and Forst-Anicon (2,4,5-T preparations) at 3% in diesel oil, applied by brush to marked trees in the clearings of thickets. Both spring and autumn treatments led to death in the following summer. Costs, at DM 75/ha, were ca. 10% of conventional cleaning costs. Unwanted beech thickets were killed by spraying at DM 120/ha, but to this the cost of clearing dead trees from the site has to be added. For.Abstr.22:3085.

1067. JOVANOVIC, S. Dejstvo nekih herbicida na vaznije korove u populikulturi. [The action of some herbicides on important weeds in poplar plantations]. Topola, Beograd 1960 15, 15-9, (Serbian f.g.).
Since mechanical control of weeds in plantations has proved impossible, tests were made with the following herbicides: (1) selective: Hedonal M (MCPA base); Agroxone (MCPA); Tributon; Duphar 2,4,5-T; 2,4,5-T Mischol AG-40; Sitosan (2,4-D + 2,4,5-T); Fitoksol '15' (15% PCP in oil); Aporizon (n-butyl ester of 2,4,5-T); Deherban (2,4-D + MCPA); (2) total: Weedicide concentrate (2,4-D); Loorverbrander (As base); and TCA. For each herbicide found suitable, the concentration and quantity required/ha, and costs are given for the eradication of Rubus caesius and Amorpha fruticosa in spring and in summer. For.Abstr.22:3074.

1068. McCURDY, E.V. (Exptl Fm, Indian Head, Saskatchewan, Canada). Control of grass growing under ash trees. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 104.
In trials in 1957 dalapon 15 ℔ applied to Agropyron cristatum growing under ash trees gave excellent control of grass, with no injury to the trees. Applications of 15 ℔ in 1958 caused slight and 20 ℔ caused severe injury to the trees. Mixtures of dalapon 15 ℔ + amitrole 8 ℔ applied in 1959 also caused severe injury, though the grasses were controlled well. - P.J.B.

BIOLOGY OF WEEDS AND POISONING BY WEEDS

1069. LEWIS, J. (Welsh Plant.Breed.Sta., Aberystwyth). The influence of water level, soil depth and type on survival of crop and weed seeds. Proc.internat.Seed Test.Assoc., 1961, 26,(1),68-85.
The results are reported of 3 experiments on the influence of depth in soil, water level of soil and soil type on the viability of the seed of oats, wheat, 7 grasses (including Alopecurus myosuroides), Trifolium pratense, Avena fatua, Geranium dissectum, Lychnis alba, Matricaria inodora, Plantago lanceolata, Rumex crispus and Sysimbrium officinale. Germination of seed in situ in the soil was the main factor responsible for the rapid initial depletion of seed populations. Where seeds were held in soil at depths below the water table for periods up to 2 months they remained dormant and the viability was maintained at a high level. In the first experiment (soil mean temperature 40.1°F) species with high germination within 1 month in aerated soil included oats, Trifolium pratense and G. dissectum; those intermediate included Festuca arundinacea and A. myosuroides and those with low germination Phleum pratense, S. officinale and P. lanceolata. In the second experiment, soil mean temperature was 59.3°F. Species with a high germination under aerated conditions within 1 month included T. pratense and G. dissectum, those intermediate were L. alba, F. arundinacea, P. pratense and P. lanceolata and those with low germination included S. officinale, M. inodora and R. crispus. Soil type in these experiments (river sand, loam and acid peat soils) did not markedly affect seed survival, though those species adapted to acid conditions survived best in acid peat than in the other soils. - P.J.B.

1070. SEXSMITH, J.J. (Agric.Res.Sta., Lethbridge,Alberta,Canada). Variable dormancy of wild oat varieties. Res.Rep. Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 103.
Data are given of hull colour, callus hair length and % germination of seed of the following, collected in Alberta in the autumn of 1958: Avena fatua var. vilis, A. fatua var. glabrata, A. fatua var. intermedia and A. fatua var. pilosissima. The % germination of these sub-species was 45.5, 42.1, 18.9 and 11.6, respectively (as determined in February, 1959). All seed samples were 100% viable. P.J.B. [O.W.]

1071. SEXSMITH, J.J. (Agric.Res.Sta., Lethbridge,Alberta,Canada). Relationship between hull color and dormancy in wild oats. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 103-4.
Mature, primary seed of wild oats was collected in the autumn of 1958 from 9 locations in S. Alberta. Blotter germination tests were made at 7-week intervals from mid-September, 1958, to 1st April, 1959. Data are given of the % germination of samples containing different proportions of grey-hulled seed. In most cases, grey hull colour was associated with a low dgree of dormancy and brown hull colour with a high degree of dormancy. All samples contained 99% viable seed. - P.J.B. [O.W.]

1072. STEVENS, O.A. (Agric.Coll.,Fargo, N.Dakota,U.S.A.). Weed development notes, Res.Rep.N.Dak.agric.Exp.Sta., 1960, 1, pp.22,bibl.14.
Brief notes are given on the biology of the following: Hordeum jubatum; Echinochloa crusgalli; Polygonum convolvulus; Kochia scoparia; Taraxacum officinale; Cuscuta spp.; Hibiscus trionum; Thlaspi arvense; Tragopogon dubius and T. major; P. aviculare and P. achoreum; Chenopodium album and C. strictum; Malva rotundifolia and M. borealis; Lactuca scariola; Iva xanthifolia; Asclepias syriaca; Brassica arvensis and B. kaber; Sinapis arvensis; Avena fatua; Setaria viridis, S. glauca and S. lutescens; Amaranthus retroflexus; A. graecizans; Portulaca oleracea; Ambrosia artemisiifolia and A. elatior; Atriplex spp.; Ambrosia trifida; Sonchus arvensis; Euphorbia serpyllifolia, Veronica peregrina; and Ellysia nyctelea, D.M.L.S. [45(78.4)]

1073. RAKHIMOV, A.V. [Weed plants of the northern part of the Tashkent oasis and some neighbouring parts of south Kazakhstan]. Trudy Tashkent.Farmatsevt.Inst., 1960, 2,65-71.
The following families are the most abundantly represented: Compositae, 91 species; Gramineae, 86; Leguminosae, 64; Cruciferae, 54; Liliaceae, 35; Labiatae, 32; Umbelliferae, 29; Cyperaceae, 26; Boraginaceae, 26; Scrophulariaceae, 22; Caryophyllaceae, 23; Ranunculaceae 20. From Ref.Zh.(Biol.), 1961, (7),7 G725. - K.A.B.

1074. MONTEIRO, H.Da C.F. (Escola Nacional de Agronomia,Rio de Janeiro,Brazil). Malvaceae Mineiras invasoras de culturas. [Weed species of the Malvaceae in Minas Gerais State]. An. Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 125-31,(Portuguese).
Descriptions are given of the following:- Sida tuberculata, S. glaziovii, S. aurantiaca, S. martiana, S. acrantha, Gaya gracilines, G. aurea, G. guerkeana, and Briquetia denudata. D.M.L.S. [O.W.]

1075. DE CARVALHO, L.F. (Instituto de Ecologia e Experimentacao Agricolas - M.A. - Rio de Janeiro,D.F.,Brazil). Plantas invasoras de culturas no estado do Rio de Janeiro. [Plant invaders of crops in the State of Rio de Janeiro]. An.Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 115-23, (Portuguese).
Gives a list of 121 weeds with common and botanical names. - D.M.L.S. [O.W.]

AQUATIC AND WOODY WEEDS AND THEIR CONTROL

1076. HALL, T.F. (Wilson Dam,Alabama,U.S.A.). Principles of aquatic plant control. Adv.in Pest Control Res., 1961, 4,211-47,bibl.105.
Subjects reviewed include: the influence and significance of aquatic weeds, the taxa represented, their biology, growth form in relation to control of different types of aquatic weeds, including water-tolerant woody species, the polarity of different compounds in relation to the penetration of cuticle and cells, and methods of control, including chemical, mechanical, physical and biological. - P.J.B. [O.W.]

1077. TIMMERMANS, J.A. (Station de Recherches des Eaux et Forets,Groenendaal-

Hoeilaart,Belgium). Lutte contre la vegetation aquatique envahissante. [Aquatic weed control.]. Trav.Sta.Rech.Groenendaal, 1961, D,31,pp.41,(F.Flemish),figs.13,bibl.6. A review. [107(493)]

1078. TIMMONS, F.L. (Univ.Coll.Agric., Laramie,Wyoming,U.S.A.). Weed control in western irrigation and drainage systems: losses caused by weeds; costs and benefits of weed control. Publ.U.S.Agric.Res.Serv.ARS-34-14, 1960, pp.22,figs.15,tabs. 8,bibl.5.
The results are given of a survey conducted in 1958 covering the 17 western States (7 Bureau of Reclamation regions) and are based on 1957 data given in 47 reports from authorities in answer to a questionnaire. The following information concerning western irrigation systems is given for the 7 individual regions and for the total area: % of infestation by different types of aquatic and ditchbank weeds; miles of channel and acreage of ditchbanks infested; amount and cost of water lost through weeds; and costs of weed control. - D.M.L.S. [24(78.7)]

1079. PAIXAO, J.DA.C. (Instituto de Ecologia,Ministerio da Agricultura,Rio de Janeiro,Brazil). Emprego de herbicidas na limpesa de valas e canais na Baixada de Sepetiba. [Use of herbicides in the cleaning of ditches and canals in the Sepetiba lowlands.]. An.Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 147-54,(Portuguese), bibl.7.
Dow 40 (2,4-D amine) 1% applied in August, September and October gave excellent kill of Eichhornia crassipes, and Arbocida (based on 2,4,5-T ester) 1% in water gave encouraging results. TCA 90% at 400 g/15 l water and Dow General Weedkiller (dinitro) 2 l in 12 l diesel oil and 200 l water were satisfactory for controlling Eleocharis sp. though some regrowth resulted from the TCA. Cyperus spp. and rhizomatous grasses including Imperata brasiliensis were well controlled by Karmex W [monuron] at 20 and 40 kg/ha and by 2 applications with an interval of ca. 10 weeks of monuron + 2,4-D. Shell 130 (aromatic oils fortified with PCP) at 400 ml/100 m^2 in 5 l water gave satisfactory results against weeds in the seedling stage, but not against mature weeds. - D.M.L.S. [O.W.]

1080. DE OLIVEIRA E SILVA, S.L. (Posta Experimental de Biologia e Piscicultura Km 47,Brazil). Influencia do 2,4-D amine sobre o planeton de ambiente lentico (Nota previa). [Influence of 2,4-D amine on plankton of marshy areas (Preliminary note).]. An. Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 145-6.
Spraying Pontederia sp. in a lake with 2,4-D amine 1% in water resulted in a temporary increase in plankton density. This was attributed to the effect of increased growth of plankton caused by the release of plant nutrients from the decay of weeds killed by the sprays. - D.M.L.S. [O.W.]

1081. HILLMAN, W.S. (Yale Univ.,New Haven,Connecticut,U.S.A.). The Lemnaceae or duckweeds. A review of the descriptive and experimental literature. Bot.Rev., 1961, 27,(2),221-87.
This is intended as a guide to the work on Lemnaceae, with particular reference to their characteristics as organisms for use in the study of the development, physiology and biochemistry of plants. - P.J.B. [O.BO.]

1082. HORTON, J.S., MOUNTS, F.C. and KRAFT, J.M. Seed germination and seedling establishment of phreatophyte species. Sta.Pap.Rocky Mt.For.Range Exp.Sta., 1960, 48,pp.26,bibl.5.
Evaluates factors influencing germination and establishment of phreatophytes in the southwest (USA), with particular reference to Tamarix pentandra, and suggests means of reducing the spread of undesirable species by manipulation of water flow. For.Abstr.22:1579.

1083. UNITED STATES AND CANADA. Control of woody plants and weed control on rights-of-way and industrial sites [6 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 104-5.
1. Brush control with various herbicides and mixtures. Data are given of the reaction of Amelanchier alnifolia, Arctostaphylos uvaursi, Corylus cornuta, Lathyrus venosus, Populus tremuloides, Prunus melanocarpa, P. pennsylvanica, Rosa sp. and Symphoricarpos occidentalis to 2,4-D, 2,4,5-T, fenac and 2,4,5-TP.
2. Response of Caragana sp. to herbicides. In trials in Alberta with different herbicides applied to old Caragana sp. hedge about 12 ft tall, 2,4,5-T isooctyl ester applied in the summer of 1958, was much more effective for controlling this species than 2,4-D butoxyethanol ester (each at 2 or 4 #). Control of intact plants was much

better than control of plants cut to a height of 1 ft, with 2 weeks regrowth at the time of spraying. 2,4,5-T at both rates prevented leaf production in 1959, but new basal shoots were produced in the autumn of this year. Dalapon 60 # was highly effective against Caragana sp., with virtually no regrowth. Granular 2,4-D and fenuron were ineffective.

3. Effect of chemical treatment of girdles on red maple (Acer rubrum). Two groups of red maple trees (2-10 in. d.b.h.) were girdled at a height of 4 ft, one group being girdled in winter and the girdles treated with herbicide in July and the other group was girdled in July and treated on the same day. 1 ml of undiluted herbicide/in. of diameter was applied to the girdle. As evaluated 14 months after treatment, amitrole 2 lb/gal, amitrole 1 lb + polychlorobenzoic acid (amine salt) 4 lb/gal, 2,4,5-T propylene glycol butyl ether ester (PGBE) and butoxyethanol ester, each at 4 lb/gal gave 88, 86, 84 and 84% kill of tops.

4. Multiflora rose (Rosa multiflora) control. Best control was given by repeated foliar spraying with 2.5, 5 or 10 lb/100 gal of 2,4,5-T PGBE in water. Monuron at 5.2 g/plant was as effective as SMDC 8 g/plant and much more effective than simazine 5.2 or 10.4 g/plant when applied to the plant bases. Monuron 10.4 g/plant gave 90% kill and 2,3,6-TBA 20.8 g/plant gave 87% kill.

5. Soil sterilants for controlling annual and perennial weeds. In trials on right-of-way infested with Muhlenbergia schreberi, Agropyron repens, Rumex sp., Taraxacum officinale and Polygonum convolvulus, plots treated with diuron 40 #, diuron 25 # + polychlorobenzoic acid (amine salts) 8 # each in 160 gal spray/ac and a sodium chlorate 40% + sodium metaborate 57% + monuron 1% mixture applied dry, gave almost complete control of all species. - P.J.B. [O.W.]

1084. GOODWIN, R.H. and NIERING, W.A. (Connecticut Coll., New London, U.S.A.). The management of roadside vegetation by selective herbicide techniques. Bull. Conn. Arboretum, 1959, 11, 4-10, figs.2.

Examples are given of the improper use of herbicides for roadside weed control and general principles and instructions for management of the mowed strip and for selective control of undesirable woody spp. and of ragweed are outlined. - D.M.L.S. [25(74.6)]

1085. FARIA, E.R. (Diemco S.A., Porto Alegre, Rio Grande do Sul, Brazil). Controle do "Espinilho" Acacia farnesiana - por meio do 2,4,5-T. [Control of thorn - Acacia farnesiana - with 2,4,5-T]. An. Semin. Brasil Herbicidas Ervas Daninhas 1958, 1959, 29-35, (Portuguese) tabs.3, bibl.11.

From observation 8 months after treatment 2,4,5-T (propylene glycol butyl ether ester) 3.824 kg/100 l diesel oil had given 95% control when applied in August to freshly cut stumps (of adult trees) and 80% control when applied to the base of the stems. 1.912 kg/100 l diesel oil was less effective and also, as a basal-stem treatment, 1.912 kg 2,4,5-T + 1.912 kg 2,4-D esters in 100 l diesel oil. D.M.L.S. [O.W.]

1086. ROBERTSON, J.A. Chemical control of eucalyptus growth. J.Aust.Inst.agric.Sci., 1960 26,(4) 367-9 bibl.2.

See Weed Abstr. 10:305. [O.RE.]

1087. SPOSTA, J.W. Chemical removal of inferior tropical tree species. Trop.For. Note Trop.For.Res.Cent., Rio Piedras, 1960, 4, pp.2.

A 5% solution of 2,4,5-T ester in diesel oil was applied to frill girdles on 1000 trees. At 12 months later 743 were dead, 203 showed various degrees of loss of vigour, and only 54 showed no crown effects. From For.Abstr. 22:1837. - J.W.F.

1088. STALLWOOD, P.L. (Lowlands Agric.Exp. Sta., Epo, Papua). Use of hormone herbicide for killing Leucaena glauca. Papua agric.J., 1960, 13,(1),41-2.

Basal-bark applications of 0.25% solutions of 2,4,5-T in kerosene or dieselene, applied in a band 6-8 in. deep at ground level to the dry bark, gave good control of L. glauca. P.J.B. [3(95)]

1089. BLANFORD, R.H. Spring treatment as an aid in controlling chamise (Adenostoma fasciculatum). Calif.Div.For.Range Impvt Studies No.3, 1960, pp.6, bibl.2.

On plots of chamise in Shasta County, cut or burned in May or June, sprouts grew rapidly but began to die in October; by the following summer, >75% of plants were dead. On plots treated in other months, the sprouts continued to grow. The difference in survival was very evident 5 years later. For.Abst.22:3109.

1090. UNITED STATES AND CANADA. Annual weeds [9 reports]. Res.Rep.Joint 16th N. Central and 10th W.Canadian Weed Control Conf., 1959, 79-81.

1. Herbicides for the control of crabgrass. In trials in Oklahoma, highly viable crabgrass [Digitaria sp.] seed was sown on 15th June on cultivated plots and 10 herbicides applied on the following day. Subsequent growing conditions were ideal. At counts 27 days after treatment, simazine 1 and 2 # and atrazine and diuron 2 # gave 100% control of crabgrass. Monuron 2 #, diuron 1 #, neburon 4 # and atrazine 1 # gave 95-98% control.

2. Control of darnel (Lolium temulentum) in flax. In Saskatchewan, treatment of darnel, at the 3- to 5-leaf stage in flax 4-6 in. tall with amiben 0.25, 0.5 or 1 # and TCA 2 or 4 # caused some suppression of darnel and increased flax yields. Dalapon at 0.5 and 1 # also suppressed the darnel.

3. Effect of early spray applications on wild buckwheat (Polygonum convolvulus). In trials in Saskatchewan during 4 years, P. convolvulus in wheat was sprayed when the wheat was emerging or at the 1-leaf stage with 2,4-D butyl or butoxyethanol ester, and the butyl esters of MCPA, MCPB and 2 4-DB each at 5 oz/ac, or at 0.5, 0.75 or 1 #, or with 5 oz/ac twice, with an interval of 1 week. Best P. convolvulus control (85-91%) was given by 2,4-D butyl and butoxyethanol esters, though the higher rates of the butoxyethanol ester tended also to reduce wheat yields.

4. The effect of herbicides and combinations of herbicides on P. convolvulus. The following were applied to P. convolvulus at the 1- to 2-true-leaf stage: 2,4-D butyl or butoxyethanol esters 5 oz/ac and 0.5 #, each in combination with amitrole, diquat dibromide, fenac and 2,3,6-TBA acid, each at 0.125 #. Barban at 0.25, 0.5 and 1 # in 10 gal water was also applied. 2,4-D (ether ester) + diquat dibromide or 2,3,6-trichlorobenzoic acid gave the best control of P. convolvulus, but all formulations resulted in reduced wheat yields (not significant).

5. Herbicides for the control of ladys thumb (Polygonum persicaria) and hemp nettle (Galeopsis tetrahit). Neburon 2,3 or 4 #, 2,3,6-TBA 1 # + 2,4-D butyl ester 0.5 # and 2,4-D butyl ester 0.5 # all gave nearly complete control of P. persicaria and neburon and 2,3,6-TBA 1 # + 2,4-D butyl ester 0.5 # gave similar control of G. tetrahit. [Growth stage at treatment not stated.]

6. Herbicides for chemical summer fallow. In trials in Saskatchewan in which simazine, 2,3,6-TBA, atrazine and 2,4-D mixed esters were applied to silty clay loam with a logarithmic sprayer on 1st June, 1 treatment with all except 2,4-D resulted in season-long control of annual broad-leaved and grassy weeds. Conditions were very dry in this season. As assessed at 6th July in the following year, the following still inhibited wheat and weed growth: EPTC 4.5 and 12 #, simazine 1.9, 2.2 and 5.8 #, 2,3,6-TBA 2.6, 4 and 8.2 # and a mixture of 2,4,5-TP 20% + dalapon 80% at 0.7 #.

7. Post-em. applications of herbicides to rape-seed. Data are given of the results of trials in which 2,4-D mixed esters, CP 1815 (MCPA + 2,3,6-TBA), Diax (93% isopropylamine salt of 2,4-D + 7% isopropylamine salt of citric acid) and mixed 2,4-D amines were applied with a logarithmic sprayer to rapeseed. Weeds included Thlaspi arvense, Chenopodium album, Salsola pestifer, Axyris amaranthoides, Portulaca oleracea, Lappula echinata, Kochia scoparia and Brassica arvensis.

8. Various herbicides for annual weed control in legumes. Data from trials in Saskatchewan are given of the control of Portulacea oleracea, Chenopodium album, Thlaspi arvense, Salsola pestifer, Axyris amaranthoides, Capsella bursa-pastoris, Descurainia sophia, Monolepsis nuttalliana and Solanum triflorum, treated when 4-8 in. tall on 14th July with MCPA ester, 2,4-D mixed amines, MCPB and 2,4-DB sodium salt, MCPA mixed amines and mixed sodium salts of MCPA + 2,4-DB applied at rates between 0.5 and 16 # with a logarithmic sprayer. No data are given of the effect on legumes.

9. Several herbicides for weed control in grass seedlings. New sowings of Bromus inermus and Agropyron cristatum were sprayed on 12th June with 2,4-D mixed amines, MCPA butyl ester, sodium salts of MCPB and 2,4-DB and mixed sodium salts of 2,4-DB + MCPB at 2 # in 34 gal water. Data are given of the effect on sweet clover (Melilotus sp.), Salsola pestifer, Chenopodium album, Portulaca oleracea, Axyris amaranthoides, Lappula echinata, Thlaspi arvense, Descurainia sophia and Capsella bursa-pastoris. Best control of most weeds was given by 2,4-D mixed amines and MCPA butyl ester. - P.J.B. [O.W.]

1091. UNITED STATES AND CANADA. Perennial weeds [12 reports]. Res.Rep. Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 72-4.

1. Chemical control of climbing milkweed (Ampelamus albidus). Where foliar applications of different herbicides were made

to rapidly growing A. albidus 10-12 in. tall on 8th and 9th July, 1957, assessments in October, 1959, indicated that 2,3,6-TBA 20 and 40 #, PBA (polychlorobenzoic acids) 40 and 60 #, erbon 180 #, simazine 12 # and amitrole 8 # (the latter followed by ploughing 2 weeks later) gave up to 95% control.

2. Control of common milkweed, (Asclepias syriaca) with amitrole-T. Treatment of A. syriaca at the full-bloom stage on 13th June, 1958, with amitrole-T (amitrole + NH_4SCN) at 2 # as an overall spray in 80 gal water, gave >99% control at June, 1959. Seedling lucerne present at the time of treatment was also eliminated. Amitrole-T at 1 and 2 lb in 240 gal water used to saturate A. syriaca plants as a spot treatment gave 90 and 95% control, respectively.

3. Systemic chemicals on scentless mayweed (Matricaria inodora). In trials in Alberta, in 1958, 2,4-D butyl ester and CP 1815 (2,3,6-TBA + MCPA) were applied in late spring, 1958, in water at 10 gal/ac to almost solid stands of M. inodora 3-4 in. tall. By early summer, 1959, plots treated with 2,4-D at 8, 12 or 16 # had full stands of M. inodora present, while those treated with CP 1815 at these rates carried 4, 2 and 1% of the original stands and those plants present were new seedlings, only.

4. Herbicides for the permanent eradication of patches of M. inodora. Treatment of patches in late spring, 1958, with 58% sodium chlorate 1, 2 and 3 lb/sq.rod, monuron 8, 10 and 12 # and amitrole 6, 8 and 10 # each in 80 gal water, failed to give complete control.

5. Control of absinthe (Artemisia absinthum). Applications of BDM (39.2% B_2O_3 + 7.5% 2,4-D) 1 and 3 lb/100 ft^2. and BIM (41.5% B_2O_3 + 4% monuron) at 2 and 4 lb/100 ft^2 applied in June in all cases gave complete control of A. absinthum, but killed grass stands. Amitrole 8 # gave 100% control of A. absinthum, but had no effect on grass stands. In further trials with phenoxyacetic acids for the control of A. absinthum, rates of 2,4-D ester or amine, MCPA ester, 2,4,5-T or 2,4-D + 2,4,5-T at rates of less than 2.5 # gave 100% control, following treatment on 21st June, 1957, and a repeat in 1958. Higher rates were required where the weed was free from competition by other plants. The results are given of further trials in which 2,4-D dimethylamine salt, 2,4,5-T mixed low-volatility esters, 2,3,6-TBA and amitrole were applied to A. absinthum and Taraxacum officinale.

6. Effect of several herbicides applied as soil sterilants to tamweed (Polygonum coccineum) in W. Nebraska. In trials on Hall clay loam sodium chlorate 6 lb/sq.rod [1 sq.rod = 30.25 yd^2] gave 100% control, concentrated Borascu (61.5% boron trioxide) 15 lb/sq.rod gave 96% control, fenac sodium salt 16 # gave 97% control and 2,3,6-TBA 48 # gave 99% control. The herbicides were applied on 5th September in 40 gal spray/ac.

7. Effect of several herbicides used as soil sterilants on bur ragweed (Franseria sp.) in W. Nebraska. In trials on Butler silt loam, infestations of bur ragweed were treated on 3rd November, 1958, and sorghum sown on part of the treated plots on 2nd July, 1959. As determined by weed counts on 10th August, 1959, sodium chlorate 6 lb/sq.rod gave 100% control of bur ragweed, but the sorghum was severely damaged. Fenac (sodium salt) at 4 # gave 73% control of bur ragweed, with no injury to the sorghum. Fenac (amide) at rates high enough to give appreciable control of bur ragweed (8 and 12 #) injured the sorghum. 2,3,6-TBA 8 and 12 # gave 78 and 92% control of bur ragweed, with 100 and 95% stands of sorghum, respectively; the 12 # rate caused leaf curl.

8. Bindweed (Convolvulus arvensis) control. In trials in Texas to determine the effect of tillage on the toxicity of herbicides to bindweed, polychlorobenzoic acid 5 and 10 # gave 13 and 64% control; 3 ploughings after herbicidal treatment increased control to 85 and 96%, respectively. Treatment with amitrole and TH did not give appreciable control. Cultivation at 3-week intervals during summer gave 69% control and applying 2,4-D ester 0.3 # at monthly intervals gave 97% control. In further trials in Texas, different formulations and derivatives of benzoic acid and phenylacetic acid were applied to bindweed on Pullman silty clay loam. Best control was secured with fenac sodium salt and fenac butyl cellosolve ester, each at 5, 10 or 20 #.

P.J.B. [O.W.]

1092. UNITED STATES AND CANADA. Wild oats [20 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 74-8.

In trials in Manitoba in which barban was applied at 0.75, 1 or 1.5 # in 5 or 30 gal at the 1- to 2-leaf or 2- to 3-leaf stage of wild oats, mean culm numbers were not greatly reduced by any treatment.

2. In further trials with barban, better selectivity against wild oats was given by treatments made at the 1.5-leaf stage than at the 3-leaf stage of the wild oats. Where a spray volume of 5 as opposed to 30 gal/ac was used, selectivity was better at the 0.5 and

1 # rates than at 0.25 #. Barban delayed the maturity of the wild oats and reduced their height and numbers of plants and tillers, rather than giving a complete kill. In trials at Lethbridge, Alberta, in which barban was used to control wild oats in wheat, kill of wild oats was greater following treatment at the 1- to 1.5-leaf stage than at the 2- to 3-leaf stage, and where spray volume was 8.1 gal, rather than 34.3. Only slight effects on the height of wheat were noted. A volume of 8.1 gal with the 0.5 # rate gave control almost equal to where 34.3 gal was used with the 1 # rate (slightly less than 80% control in each case). Setaria viridis stands were almost unaffected by any treatment. In further trials in S. Dakota, barban was applied at 0.125, 0.25, 0.5 and 1 # in 12.5 or 25 gal spray applied to oats at the 2-, 2.5-or 3-leaf stages in wheat at the 2.5-, 3-or 3.5-leaf stages, respectively, or to wild oats at the 3-, 4- or 5-leaf stages in flax 2, 4 or 6 in. tall. All treatments significantly reduced wild oat stands, especially the 0.5 and 1 # rates of barban. Wheat yields were significantly higher on treated than untreated plots, but there were no differences between treatments. Flax yields were significantly lower on plots treated with the 0.5 and 1 # rates than where the 0.125 and 0.25 # rates were used. Conditions were very dry in these trials. In trials in Manitoba with di-allate and EPTC, these herbicides at 2, 4 or 6 # were applied 1 week before sowing wheat, flax and sunflowers on soil heavily infested with wild oats and Setaria viridis. Wheat stands were severely reduced by all treatments. Flax stands were unaffected by the 2 # rates of either herbicide and yields were significantly greater than those of controls as a result of reduced weed competition. Sunflowers were unaffected by any treatment and the 6 # rate of either herbicide gave almost complete control of both weed species. Di-allate 4 # gave wild oat control ranging from 78-100% and of S. viridis from 69-94%. EPTC 4 # gave control of wild oats ranging from 80-99% and of S. viridis from 75-98%. In trials in Alberta in which EPTC and di-allate 2, 4 or 6 # were applied on 11th May, incorporated immediately and flax sown on the following day, all rates of EPTC increased flax yields by about 50%; the 4 and 6 # rates caused temporary injury, but gave 95 and 93% control of wild oats, respectively, compared with 75% for the 2 # rate. Di-allate at all rates gave >99% control of wild oats and increased flax yields by about 65%; the 6 # rates caused temporary crop injury. In trials in Saskatchewan in which EPTC and di-allate at 2, 4 or 6 # were applied, disced-in and wheat sown 1 week later, all rates of di-allate gave excellent wild oat control, while only the 6 # rate of EPTC gave a comparable degree of control. In further trials in which EPTC and di-allate 2, 4 and 6 # were applied 3 days before sowing wheat and flax, there was little difference in effect on wild oats between incorporation with a rotary cultivator or discs. EPTC injured the wheat at all rates; flax showed some injury at the 6 # rate, only. Di-allate had no effect on wheat at 2 #, caused some injury at 4 # and severe injury at 6 #. Flax showed injury from di-allate at the 6 # rate only. In trials in which granular di-allate 1.5, 3 and 6 # and liquid di-allate (solventless), 2,6-dichlorobenzonitrile and Zytron (O-(2,4-dichlorophenyl)-O-methylisopropylphosphoramidothioate) (applied with a logarithmic sprayer) were used to control wild oats in wheat and barley, the herbicides were applied, incorporated by discing once or twice and the crop sown on the following day. Two discings appeared to give better control of wild oats than one. 2,6-dichlorobenzonitrile at rates of >1 # gave >75% control of wild oats but severely reduced wheat stands. Di-allate (liquid) at rates of >1 # gave >95% control of wild oats; granular di-allate at 3 and 6 # gave 95 and 95% control. Zytron 16 # had no effect on wild oats or wheat. Data are also given of trials in Saskatchewan in which EPTC was applied with a logarithmic sprayer to wild oats in barley, flax, rape, oats and wheat. In trials in Alberta on the residual effect of EPTC 5 and 10 # and 1,2,4,5-tetrachlorobenzene (M-1294) 10 and 20 #, these herbicides were applied in granular form in 1958 in either early spring or autumn to soil heavily infested with wild oats, followed by immediate incorporation. EPTC in spring at 5 # allowed very few wild oat plants to grow in 1959 and the 10 # rate permitted none to grow; there was no effect on flax growth, but the vigour of barley sown in 1959 was reduced. EPTC applied in autumn 1958 prevented all growth of wild oats in 1959, but injured both flax and barley. M-1294 was less toxic to wild oats than EPTC, but equally toxic to flax and barley. In further trials in Alberta with EPTC, di-allate and 2,6-dichlorobenzonitrile, EPTC and di-allate 2, 4 and 6 # were applied on 21st April to loam soil heavily infested with wild oats. After spraying, plots were double-disced either once or twice and sown to barley on 28th April and

to barley and flax on 13th May. Di-allate 2 and 4 # reduced wild oat numbers by 80% and barley numbers by nearly 50% where 4 and 6 # were applied. EPTC 4 and 6 # reduced wild oat numbers by 85% and barley numbers by 50%. Di-allate at all rates and EPTC 4 and 6 # resulted in highly significant barley yield increases. 2,6-dichlorobenzonitrile 1 and 2 # had no effect on wild oats or crops. In a similar trial on lighter soil, di-allate reduced wild oat numbers by 90-95% and the number of Setaria viridis plants by 40-45%. Flax was more tolerant to EPTC and di-allate than barley. In a third trial, di-allate granular and liquid 4 and 6 # and EPTC 4 # all significantly reduced the number and yield of barley plants under nearly weed-free conditions. The mode of incorporation did not influence the effect of either herbicide. In trials in Alberta on silty clay loam, the following were applied on 3rd June, followed by immediate incorporation with a disc: EPTC liquid 3 #, EPTC granular 2 and 3 #, 2,6-dichlorobenzonitrile 1 and 2 #, di-allate 2 and 4 #, propham 4 and 6 # and endothal 6 and 8 #, all (except EPTC granular) in 34.3 gal spray. As assessed visually on 27th July, excellent control of wild oats and Setaria viridis was given by EPTC granular 2 # and EPTC liquid 3 #, with no injury to potatoes, slight injury to sugar beet, peas, beans and maize, some injury to carrots and flax and severe injury to cucumber, mustard, barley and wheat. 2,6-dichlorobenzonitrile gave fair to good control of wild oats and broad-leaf annuals, with only moderate injury to peas, beans, flax and maize. Di-allate 2 # gave very good control of wild oats and fair control of S. viridis; propham gave equal control of wild oats, but none of S. viridis. Di-allate 2 # caused no injury to potatoes, sugar-beet, peas, beans and maize and only slight injury to cucumbers, carrots, mustard and flax. Endothal gave poor weed control. In a trial in Alberta in which 2,6-dichlorobenzonitrile was applied at 1, 2 and 3 #, followed immediately by discing and sowing wild oats, it was concluded from the results that, as used in these trials, this herbicide had no apparent potentiality for controlling wild oats. In another trial in Saskatchewan with this herbicide applied at 0.5, 1 and 2 #, followed by incorporation there was a marked reduction in natural populations of wild oats, but no control. In trials on irrigated silty clay loam in Alberta, simazine 1 and 2 #, atrazine 1 and 2 # and trietazine 2 and 4 # were applied on 3rd June, followed by discing twice. Simazine and atrazine 1 # gave excellent control of wild oats (as assessed on 27th July, but only fair control of S. viridis. Both severely injured all crops except maize. Trietazine 2 # gave good control of wild oats and fair control of S. viridis, with only slight injury to potatoes and peas. The results are given of trials in Alberta to determine the effect of nitrate fertilizer on stands of wild oats and seed viability and on the effect of different dates of autumn tillage on the number of wild oat plants in barley. - P.J.B. [O.W.]

1093. UNITED STATES AND CANADA. Quackgrass [9 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959 66-8.

1. In Wisconsin, atrazine was applied to dense stands of Agropyron repens on silt loam soil on 17th April, at 2, 4 or 8 # in 20 gal spray. Nitrogen was applied at 100 # at the time of treatment (17th April), at 50 # at treatment + 50 # before ploughing on 12th May, or at 100 # just before ploughing. An overall application of 500 # 10-10-10 (NPK) was applied on 1st May. Maize was sown after ploughing and diuron 2 # applied overall on 27th May to control annual weeds. A. repens shoot numbers (assessed 16th June) ranged from 5.9 to 15.9/ft^2 for the different treatments, compared with 64.6/ft^2 for controls which received nitrogen only. Virtually no A. repens remained in October on plots treated with 4 and 8 # and maize growth was excellent in all cases. Heavy nitrogen applications did not overcome the effect of competition from the A. repens.

2. In trials in Alberta, on the use of dalapon in combination with tillage for the control of A. repens, dalapon was applied to a stand 8 in. high, followed by discing 3 weeks later and retreatment with dalapon 6 weeks later, when A. repens regrowth was 8 in. high, followed by further tillage 2 and 8 weeks later. In the dry conditions of this year, tillage alone gave 84% control in the following summer, but later recovery was rapid. The results with dalapon indicated that rates of at least 6 # at each application should be used and, applied in this way in these trials, gave 95% control.

3. In trials in Alberta, on the residual effect on A. repens of fenuron (20-100 #) and monuron 40 #, these herbicides were applied in 1953. At 40 #, both herbicides gave about the same initial degree of control of A. repens, but re-establishment was complete after 6 years on fenuron plots;

on monuron plots re-establishment was only partial. A rate of 80 # fenuron was needed to give complete kill.

4. In trials in Alberta, on the control of A. repens by monuron + tillage, monuron was applied at 10-80 # in late spring or early autumn. Monuron was most effective applied in spring to undisturbed A. repens stands; 20 # gave complete control.

5. EPTC 5, 10 and 15 # applied in spring to A. repens stands about 10 in. tall, followed by discing immediately and again 2 months later, gave about 60% control in late autumn.

6. In trials on dense A. repens sod, regrowth 6-10 in. high was treated on 11th June with TCA 50 and 100 #, fenac 5, 15 and 30 # and cacodylic acid 5, 15 and 30 #, all in 50 gal water. On 7th July, half of each plot was rototilled. As assessed on 22nd September, cacodylic acid gave poor results, TCA + tillage was highly effective (97 and 100% reduction for 50 and 100 #, respectively), while fenac 15 and 30 # + tillage gave 98 and 99% reduction. Fenac was also outstanding in preventing annual weed growth.

7. In glasshouse trials, A. repens, Festuca rubra and Poa pratensis were each treated with fenac at 4, 8 or 16 #. There was no evidence of useful selectivity in the effect of fenac as between the 3 grasses.

8. Amitrole and 2,3,6-TBA were applied to A. repens sod by means of a logarithmic sprayer, using initial rates of 20 #. These treatments were combined with different mowing and tillage treatments during 2 successive years. Data are given of the minimum rates of herbicide needed to give different degrees of A. repens control.

9. In further trials in which TCA, dalapon and amitrole were applied in one season either alone (3 sprayings) or once, followed by 2 cultivations, the latter gave better control than did 3 sprayings alone. - P.J.B. [O.W.]

1094. UNITED STATES AND CANADA. Johnsongrass [5 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 65-6.

1. Stands of Johnson grass [Sorghum halepense] in Kansas were mown on 22nd August, 1958, burned when dry and the regrowth sprayed with dalapon 15 # on 12th September, when the regrowth was 10-14 in. high, followed by ploughing on 20th October and sowing wheat on 23rd October. Excellent control of Johnson grass was obtained in spring and summer, 1959, with no injury to the wheat.

2. In trials in Kentucky on the use of EPTC, stands of Johnson grass were ploughed in early July and on 10th July EPTC was applied at 3, 6, 9 and 12 # in 28.5 gal water, followed by rototilling. The soil was dry at the time of treatment and there was heavy rainfall one week later. Maize sown 3 weeks after applying EPTC showed no injury, while that sown 3 days after showed considerable injury. EPTC markedly reduced numbers of Johnson grass seedlings rootstock plants, and annual grasses, especially at rates above 6 #. In another similar trial, maize sown 9 days after treatment emerged well and little phytotoxic effect was noted where 9 # had been applied. Johnson grass numbers (mostly rootstock plants) were reduced by 56 and 85% by the 3 and 6 # rates.

3. Johnson grass plants from rootstocks established in 1958 were treated when 12-24 in. tall on 16th June, 1959, with fenac (sodium) 2, 4 and 8 # and dalapon 3.75, 7.5 and 11.25 #, each in 32 gal water, followed by ploughing one week later. Johnson grass plants were reduced 17, 35 and 62%, by the 3 fenac treatments, respectively, and 86, 87 and 88% by the dalapon. All rates of fenac injured maize sown 11 days after application and the 8 # rate injured maize sown 17 days later.

4. In trials in Kentucky on the control of Johnson grass seedlings in maize in which effective rootstock control practices had been used during the two previous seasons, EPTC 1.5-6 # in bands 13.3 in. wide over the rows incorporated 3 in. deep or applied to the soil surface at the same time as maize was sown resulted in reductions in weed numbers of 92 and 99%, respectively, for incorporated applications and 90 and 98% for surface applications, compared with 77% for flame cultivation. Under conditions of dry soil for 2 weeks after EPTC treatment, maize stands were markedly reduced, especially for incorporated treatments.

5. In trials with herbicides for the spot treatment of Johnson grass the following were applied in autumn to plants ca. 1 ft tall: kerosene, kerosene + hexachlorocyclopentiadiene 10 and 20 ml/gal, kerosene, hexachloroacetone (HCA) 190 and 380 ml/gal kerosene, TCA sodium salt at 1 lb/gal water, and sodium chlorate (dry). Control with the different treatments ranged from 71% for TCA to 92% for HCA at 180 ml/gal kerosene. - P.J.B. [O.W.]

1095. FORSTER, R. (Inst.Agron.Est.Sao Paulo, Campinas, Brazil). Dalapon no combate ao massambara. [Dalapon for the control

of massambara (Sorghum halepense). An. Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 39-42,(Portuguese),tabs.3.
Preliminary trials with dalapon at 0.25-1 g/m^2 and at 0.25 g/m^2 applied 1-3 times are described and the results compared with those from hand-digging. - D.M.L.S. [O.W.]

1096. UNITED STATES AND CANADA. Foxtails [6 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 78-9.
1. TCA applied to oats and barley for the control of green foxtail (Setaria viridis). In Manitoba, TCA at 1.5 and 3 # in 12 gal water was applied when S. viridis plants were in the early seedling stage and oats and barley at the 4-leaf stage. The 1.5 and 3 # rates gave 58 and 72% control of S. viridis in oats and 54 and 80% control in barley. There was no significant effect on oat and barley yields.
2. Granular CDAA, simazine, EPTC, fenac, amiben and Zytron pre-em. for control of Setaria spp. in maize. The following were applied in 14 in. bands over maize rows on 10th May: CDAA and EPTC 3, 4 and 5 #, simazine and amiben 2, 3 and 4 #, fenac 1, 2 and 3 #, and Zytron (O-(2,4-dichlorophenyl)-O-methylisopropylphosphoramidothioate) 8, 12 and 16 #, under moist soil conditions. EPTC 5 # and amiben 2, 3 or 4 # reduced maize stands. Simazine 4 #, CDAA 5 # and fenac 2 or 3 # gave 95% reduction in weeds. Simazine 3 #, CDAA 4 #, fenac 1 # and amiben 4 # gave 85% reduction. A Gandy applicator was used in these trials and may not, in all cases, have given accurate application.
3. Dalapon, amitrole, atrazine and Zytron applied post-em. for controlling Setaria spp. in maize. These herbicides were applied on 7th June to maize at the 3-leaf stage and Setaria spp. 2-3 in. tall, or on 11th June to maize in the 5-leaf stage and Setaria spp. 3-5 in. tall. As assessed on 25th August, dalapon 1-4 # gave 100% control of Setaria spp., but rates greater than 2 # injured the maize. Amitrole was more effective at the earlier date of spraying and rates of 1-4 # gave 0, 73 and 95% control when followed by 1, 2 or 3 cultivations, respectively. Transient injury was caused to the maize. Atrazine and Zytron were less effective than amitrole.
4. Effect of pre-em. sprays on Setaria viridis. 2,4-D butyl ester and butoxyethanol ester, each at 0.5, 1, 2 and 4 #, were applied as top sprays one week after sowing wheat. The 2 # rate prevented the S. viridis setting seed and reduced wheat yields by 1.2 bu/ac in the case of the butyl ester and by 5.9 bu/ac with the butoxyethanol ester.
5. Effect of herbicides on S. viridis in wheat. Wheat at the 3-leaf stage was sprayed with the following: 2,4-D butyl ester 5 oz/ac and 0.5, 1 and 2 #, and barban, fenac and 2,3,6-TBA, each at 0.25, 0.5 and 1 #. Only 2,4-D 1 and 2 # had any effect on the S. viridis and, at these rates, suppressed seed setting, but also caused crop deformities and reduced grain yields by 4.1 bu/ac (2 # rate). - P.J.B. [O.W.]

1097. UNITED STATES AND CANADA. Canada thistle and perennial sow thistle [8 reports]. Res.Rep.Joint 16th N.Central and 10th W. Canadian Weed Control Conf., 1959, 68-9.
1. Tabulated data from trials in Manitoba are given of Canada thistle (Cirsium arvense) control and wheat yields following treatment of plants at the bud or full-bloom stages or of regrowth 6 in. high after mowing, with amitrole 1.5, 3 or 6 # or 2,3,6-TBA 5, 10, 20 or 30 # with or without cultivation. 2,3,6-TBA in all cases markedly reduced wheat yields. Best C. arvense control and highest wheat yields were given by intensive cultivation, alone.
2. In trials in Saskatchewan with combined herbicide and cultural treatments for controlling C. arvense and Sonchus arvensis during the fallow year of a 3-year rotation, complete kill was secured by applying amitrole 6 or 8 # to thistles 4-6 in. tall, with normal tillage resumed 2 weeks later. The other herbicidal treatments (2,4-D butyl ester, 2,4-DB butyl ester) resulted in almost complete thistle control. Boron herbicides resulted in too persistent soil sterility for fallow use.
3. The following herbicides were applied to mixed infestations of C. arvense and S. arvensis var. glabrescens 4-8 in. tall in a wheat crop 10 in. tall: 2,4-D butyl ester, MCPA butyl ester and MCPA butoxyethanol ester 0.25, 0.5 and 1 #, 2,4-DB butyl ester 0.5, 1 and 2 # and MCPB butyl ester 1 #. Best top kill (45-50%) resulted from treatment with the 1 # rate of 2,4-D butyl and butoxyethanol ester and 2,4-DB butyl ester. These herbicides did not reduce wheat yields below those of controls.
4. In trials in Alberta with a number of new herbicides applied to C. arvense 4-6 in. tall in barley, 2,4-D butyl ester at 0.5 # and 2,4-D butoxyethanol ester, MCPA butyl ester, Diax (2,4-D isopropylamine salt + citric acid) and 2,4-DB and MCPB at 1 # prevented budding or flowering. At rates of less than 0.5 #, 2,4-D mixed amine salts and the diethanolamine

salt, mecoprop, 2,3,6-TBA and CP 1815 (2,3,6-TBA + MCPA) gave markedly poorer control.

5. In trials in which different herbicides were applied to C. arvense in the bud stage on 12th July as a substitute for part of the tillage operations on fallow, amitrole at 4, 6 or 8 #, 2,4-D butyl ester 0.5 # + 0.5 # again 10 days later and 2,4-D butyl ester 2 # on 12th July, only, gave good control of C. arvense, with increased barley yields in the following year.

6. In trials in which different herbicides were applied to dense stands of C. arvense at the bud stage in July, amitrole at 10 and 12 # gave excellent control. 2,3,6-TBA 10 # resulted in severe damage, but some regrowth occurred after cultivation.

7. The minimum rates required to give 100% control of Sonchus arvensis following the application on 2nd July of 2,4-D butyl, amitrole-T (amitrole + NH_4SCN), MCPA butyl ester and 2,4-D butoxyethanol ester were 1, 1.2, 0.8 and 0.8 #, respectively, and in the case of C. arvense 2.9, 3.9, 3.2 and 2.7 #. - P.J.B. [O.W.]

1098. UNITED STATES AND CANADA. Leafy spurge [5 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 69-70.

1. In trials in S. Dakota with several herbicides applied in 12 gal spray/ac to leafy spurge (Euphorbia esula) on 10th June when the E. esula was beginning to flower, the following appeared to have resulted in >95% kill by mid-August: caesium salt of 2,3,6-TBA 3-8 #, lithium salt of 2,3,6-TBA 4-8 #, fenac 4-8 #, potassium salt of 2,3,6-TBA 6-8 # and amitrole-T (amitrole + NH_4SCN) 8-16 #.

2. Data from trials in Saskatchewan are given of the % control of E. esula and Linaria vulgaris following the application of borax, BDM (39.2% B_2O_3 + 7.9% 2,4-D) and BMM (41.5% B_2O_3 + 4 % monuron).

3. Data from trials in Saskatchewan are given of the % control of E. esula in aspen (Populus sp.) following treatment on 7th April with (rates in lb/100 ft^2) BDM 1 and 2, borax 2 and 4, Cal. pellets (13% monuron + 8% 2,4-D) 0.5 and 1, Cal. maintenance (6.9% 2,4-D + 9.4% dalapon + 1.6% monuron) 0.5 and 1, Cal. tad (5% 2,4-D + 7% dalapon) 0.5 and 1, CC 548 (95% sodium metaborate + 5 % MCPA + 2% monuron) 2, CC 520 (93% sodium metaborate + 5% MCPA + 2% monuron) 2 and dalapon 10, 20 and 40 #. Control of E. esula (in 1959) ranged from 90-100% in all cases, except for dalapon 10 #. Aspen appeared to be slightly injured by dalapon only.

4. Data are given of the number of treatments (during 3 years) and dosage rates of 2,4-D butyl ester required to give 95 and 100% control of E. esula and (5) the % control of E. esula and Agropyron repens resulting from different mowing and tillage treatments in combination with amitrole. - P.J.B. [O.W.]

1099. UNITED STATES AND CANADA. Hoary cress [3 reports]. Res.Rep.Joint 16th N.Central and 10th W.Canadian Weed Control Conf., 1959, 71.

1. Treatment of solid stands of hoary cress (Lepidium draba) at the full-bloom stage on 22nd May, 1958, gave the following results by July 1959: amitrole 2 and 4 # 98 and 99% control, amitrole-T (amitrole + NH_4SCN) 2 and 4 # 99 and 99% control, amitrole 2 # + PCP 6 # 80%, amitrole-T 2 # + PCP 6 # 75% control. All herbicides were applied in 40 gal water.

2. Where L. draba was treated (in Saskatchewan) on 3rd June under very dry conditions, followed by cultivation in July, amitrole 9 # resulted in almost complete eradication by September. Amitrole-T at 6 # appeared to have given 100% control, as did 2,3,6-TBA sodium salt 10 and 15 #.

3. In trials in Saskatchewan on the control of L. draba under crabapple trees, amitrole 8, 10 or 12 # applied in early June (L. draba in flower) gave excellent control and did not injure the trees; amitrole-T appeared to be slightly less effective. - P.J.B. [O.W.]

1100. UNITED STATES AND CANADA. Toadflax [8 reports]. Res.Rep.Joint 16th N.Central and 10th W. Canadian Weed Control Conf., 1959, 71-2.

1. In trials in Saskatchewan with different crop-rotation practices for the control of toadflax (Linaria vulgaris), the use of good tillage practices during the fallow period resulted in complete eradication.

2. In trials with boron herbicides and amitrole applied to L. vulgaris on fallow land, amitrole 8 # applied on 25th July, 1958, followed by tillage resulted in complete control by autumn, 1959.

3. The following are the results of trials in Saskatchewan to determine the minimum dosage rates of herbicides applied (once) in September 1959 with or without retreatment once or twice in 1959 (in terms of minimum rates required to give

100% control of L. vulgaris): (a) CP 1815 (2,3,6-TBA + MCPA) 2 sprayings in 1959, 2.2 #; (b) erbon, 2 sprayings 1959, 8.5 #; (c) 2,4-D esters, 1 spraying in 1959, 6 #; (d) 2,4-D + 2,4,5-T, 2 sprayings in 1959, 4 #; (e) 2,4,5-T, 2 sprayings in 1959, 1 #; (f) 2,3,6-TBA, 1 spraying in 1959, 2 #. July retreatments appeared more effective than June. Erbon 10 # and 2,3,6-TBA 2.8 # gave 100% control of grasses.

4. Urox (monuron trichloroacetate) 120 and 200 #, Cal. pellets (13% monuron + 8% 2,4-D) 217 # and Cal. maintenance (9.4% dalapon + 6.0% 2,4-D + 1.2% monuron) 217 # were applied in granular form on 14th April, 1958, to sandy loam soil carrying mixed stands of L. vulgaris and grasses. The 200 # rate of Urox, Cal. pellets and Cal. maintenance gave 80, 70 and 55% control, respectively, of L. vulgaris in September, 1958; control deteriorated in all cases in 1959; Cal. maintenance completely controlled all grasses in both years.

5. Data from trials in Saskatchewan are given of the minimum rates of amitrole required to give 75, 90, 95 and 100% control of L. vulgaris in grasses following an initial treatment on 1 of 7 different dates in 1958, followed by 1 or 2 retreatments in 1959. Autumn treatments with amitrole appeared to be more effective than spring. June retreatments were more effective than May and August more than July. In 1958, complete control of top growth was achieved only by August and September treatments with 10 #.

6. Data are given of the control of L. vulgaris and Euphorbia esula resulting from spring or autumn treatment with borax at rates of 300-1800 #. With some exceptions, autumn treatments were more effective than spring.

7. In similar trials with BDM (39.2% B_2O_3 + 7.5% 2,4-D) at single rates of 200-1000 #, best control of L. vulgaris and E. esula was given by autumn treatments. - P.J.B. [O.W.]

1101. EICHWALD, K. Veronica filiformis - a dangerous weed. Sots. pollumajandus, 1960, (11), 505, (Estonian).
From Ref.Zh.(Biol.), 1961, (1),1 G821.

1102. CASANOVA, A. and LHOSTE, J. (Societe Procida, France). La destruction chimique des roseaux. [Chemical control of rushes]. Phytoma, 1961, 125,23-6,(illus.), (F.),tabs.2,bibl.6.

In 1 trial where both herbicides were applied in June at 9.6, 14.4, 19.2 and 24 kg/ha to Phragmites communis 1.10-1.50 m high in an irrigation canal, the % reduction of regrowth 1 year after treatment was ca. 91-95% from dalapon, there being little difference between the rates, and ca. 87.5-95% from DBT sodium (soluble powder containing 60% sodium salt of 2,2-dichlorobutyric acid and 40% sodium salt of mono- and trichlorobutyric acids) which gave increasing control as the doses increased. In another trial, dalapon 21.25 kg/ha and DBT sodium 15 kg/ha gave complete control of P. communis and Typha latifolia both when applied in 100 l and in 1200 l, but 1 year after treatment new weeds had invaded the plots, the dominant weed in the DBT sodium plots being Sparganium ramosum, thus confirming that this weed is more resistant to dalapon than to DBT sodium. - D.M.L.S. [O.W.]

1103. DE MALLMANN, R.J. and DUPRAT, A. La destruction tardive des mauvaises herbes resistantes aux hormones. [The late destruction of weeds which are resistant to hormone weed killers]. Phytoma, 1960, 116,27-8,(F.) tabs.1.

A mixture of MCPA and dinoseb, which has been in use in Belgium for 2 years, gives control of [Matricaria sp.], [Polygonum sp.] and [Chrysanthemum segetum], as well as the spp. normally controlled by MCPA. In a trial in Seine et Oise a mixture of MCPA 800 g/ha and dinoseb 552 g/ha gave better control of [Matricaria inodora] and [Polygonum aviculare] than did MCPA 1.2 kg/ha or mecoprop 2,24 kg/ha. Mecoprop 3.2 kg/ha gave comparable results, but was more costly. All treatments except mecoprop 2.24 kg/ha gave complete control of [Ranunculus arvensis]. - D.M.L.S. [O.W.]

1104. CABLE, D.R. (Rocky Mountain For. and Range Exp.Sta., Fort Collins, Colorado, U.S.A.), Small velvet mesquite seedlings survive burning. J.Range Mgmt, 1961, 14,(3),160-1, figs.2.

In a study on the Santa Rita Experimental Range, near Tucson, Arizona, young velvet mesquite (Prosopis juliflora var. velutina) plants growing in a dense grass cover were burned in March when 8 months old, or in June when 12 months old. Burning killed about 60% of the plants irrespective of their age when burned; the remainder suffered top-kill but resprouted from their base. It was concluded that burning was ineffective as a means of eradicating velvet mesquite. - P.J.B. [O.W.]

1105. JOHNSON, A. and SING, T.K. Cleome ciliata Schum. et Thonn. in Singapore. Gdnr's Bull., 1959, 17,(2),325-30, bibl.7.
C. ciliata, introduced originally from tropical Africa, is now widely distributed in the Federation of Malaya. The morphology of the plant at different growth stages is described. The seed requires exposure to direct sunlight for at least 2 hours/day before germination occurs. - P.J.B.

1106. KRAMER, M. and GREGORI, R. O emprego dos "Compostos de Karmex" no controle do "leiteiro" (Resultados preliminares). [Use of Karmex compounds to control "milky plant" (Tabernaemontana fuchsiaefolia). (Preliminary results)]. An. Semin. Brasil Herbicidas Ervas Daninhas 1958, 1959, 161-7, tabs.2, bibl.2.
In a preliminary trial, monuron wettable powder 6.4 g/plant applied in the spring gave 90% control of T. fuchsiaefolia and was much more effective than diuron at similar rates. Fenuron spray 3.2 and 6.4 g/plant applied twice with an 8-month interval killed the plant, but was not economic. D.M.L.S. [O.W.]

1107. BOOCK, O.J. (Inst. Agron. do E. de S. Paulo, Campinas, S.P., Brazil). Combate a tiririca com o nematicida D.D. [Control of tiririca with the nematocide DD]. An. Semin. Brasil Herbicidas Ervas Daninhas 1958, 1959, 135-40, tabs.1.
DD (1:1 mixture of dichloropropane and dichloropropene) gave complete control of Cyperus rotundus when injected into the ground at 150-200 ml/m^2. The best time of application was in the winter, when tubers were dormant. Application near perennial plants should be avoided. - D.M.L.S. [O.W.]

CHEMISTRY, PHYSICS, TOXICOLOGY, RESIDUES AND SOILS

1108. * KOOPMAN, H., UHLENBROEK, J.H., HAECK, H.H., DAAMS, J. and KOOPMANS, M.J. (N.V. Philips Duphar). Investigations on herbicides. 2. 2-Alkyloxy and 2-aryloxy 4,6-dichloro-1,3,5-triazines, 2-alkylthio, and 2-arylthio 4,6-dichloro-1,3,5-triazines. Rec. trav. chim., 1959, 78,967-80.

1109. MATOLCSY, G., HAJRAN, M. and VEGH, A. (Novenyvedelmi Kutato Intezet, Budapest, Hungary). Hydrophilic 2,4-diamino-6-chloro-s-triazine derivatives as herbicides. Magyar Kem. Folyoirat, 1959, 65,414.
Preparation and properties. From Chem. Abstr. 54:6727 - P.J.B.

1110. * RAKITIN, Yu.V., NELNIKOV, N.N., SHIDLOVSKAYA, I.L. and BOKAREV, K.S. (Timirjazev Inst. Plant Physiol., Moscow). Structure and physiological activity of some 2,4,5-trichlorophenoxyacetylamino acids. Fiziol. Rastenii, Akad. Nauk S.S.S.R., 1959, 6,729-34.

1111. TOLBERT, N.E. (Michigan State Coll., East Lansing, U.S.A.). (2-Chloro-ethyl) trimethylammonium chloride and related compounds as plant-growth substances. 1. Chemical structure and bioassay. J. Biol. Chem., 1960, 235,475-9.

1112. BOKAREV, K.S. and NELNIKOV, N.N. 2,4,5-Trichlorophenoxyacetic acid. Org. Inseltofungitsidy i Gerbitsidy, 1958, 290-7.
The preparation of 2,4,5-T is described. From Chem. Abstr. 54:12032. - P.J.B.

1113. ANASTACIO, M. De L.A. (Instituto de Quimica Agricola, Ministerio da Agricultura, Brazil). Metodos analiticos para a dosagem de alguns herbicidas. [Analytical methods for estimation of some herbicides.] An. Semin. Brasil Herbicidas Ervas Daninhas 1958, 1959, 199-209, (Portuguese), bibl.11.
Methods for the following are given: arsenious oxide, arsenate, boric acid and borates, alkali cyanate, potassium thiocyanate, copper sulphate, 2,4-D, MCPA, 2,4,5-T, propham, monuron and fenuron. D.M.L.S. [O.W.]

1114. MEYSSON, G. and THONG, T.T. Cytotoxicity of wetting agents. Ann. pharm. franc., 1959, 17,420-30.
The following wetting agents were tested: (a) Cequartyl A (an alkyl dimethylbenzyl ammonium chloride; cationic), (b) sodium lauryl sulphonate (anionic) and (c) Tween 80 (non-ionic). Wheat seed germination was inhibited by (c) at 5 x 10^{-3}M and at 2 x 10^{-3}M inhibited the growth of wheat seedlings; at 2 x 10^{-3}M it inhibited the growth of pea roots, but even at 10% did not affect onion roots. Both (a) and (b) singly inhibited mitosis in onion bulbs; the effect of mixtures of (a) and (b) was purely additive. At 5 x 10^{-6}M (a) greatly reduced mitosis in onion root cells and in 3 days caused cell death. The presence of (c) protected against the effect of (a). From Chem. Abstr. 54:14558. - P.J.B.

1115. McARDLE, F.J., MANETSKI, A.N., WILEY, R.C. and MODREY, M.G. (Pennsylvania Agric.Exp.Sta., University Park and Maryland Agric.Exp.Sta., College Park, U.S.A.). Influence of herbicides on flavor of processed fruits and vegetables. J.agric. fd Chem., 1961, 9,(3),228-30.

The results are given of tests with 28 herbicides to determine their effect on the flavour of processed (canned or frozen) vegetables. The herbicides were applied either at rates used for practical weed control or, in some cases, at rates in excess of these. In no case did any herbicide result in the products being placed in the category of "definite off-flavour". The following were among the herbicides which resulted in ratings inferior to the standard samples: chlorazine, (2-chloro-4,6-bis (diethyl-amino)-s-triazine), diuron, neburon, CDAA, simazine and 2,4-D amine. - P.J.B. [O.W.]

1116. FORSTER, R. and VIEIRA de MORAES, M. (Inst.Agron. do Est de Sao Paulo, Campinas, Sao Paulo, Brazil). Influencia de alguns herbicidas no gosto do cafe. [The effect of some herbicides on the taste of coffee]. An.Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 43-6, (Portuguese).

From 3 experiments with var. Bourbon, it was concluded that none of the following caused a taint in coffee (dosage rates and age and stage of growth of coffee are not given): pre-em., TCA, monuron, PCP, chlorpropham; post-em., dalapon, dinoseb (alkanolamine) + diesel oil, 2,4-D + TCA or dalapon and MCPA. - D.M.L.S. [O.W.]

1117. PHYTOMA. La dixieme session du conseil de l'O.E.P.P. [The tenth session of the council of O.E.P.P.]. Phytoma, 1960, 121,39-42,(F.).

P.40. The problem of toxic residues. It was decided at this session of the European Organization for Plant Protection that a group should be set up to study the effects of pesticides on human and animal health. It was agreed that it should collaborate with committees of the International Union for Pure and Applied Chemistry and of the International Wine Office, both of which had been charged with similar studies. - D.M.L.S. [O.W.]

1118. DREESEN, J. (Nat.Agric.Chem. Assoc., Washington D.C., U.S.A.). Use of 2,4-D on wheat and pastures. NAC News Pest.Rev., 1961, Apr., pp.4, bibl.4.

The U.S.D.A. approved rates of 2,4-D for use in range land, pastures, grass and clover crops for the control of various types of weed are given and the correct time of application specified. A 1960 review of data concerning possible 2,4-D residues from pre-harvest application in wheat produced no evidence of [appreciable] residues in grain treated with the recommended rate in the soft-, stiff-, or hard-dough (pre-harvest) stages; when applied at 1 lb. or less at such stages the residue ranged from 0.0-0.4 p.p.m. and from 20 samples in 4 locations in Kansas and Nebraska averaged 0.09 p.p.m. When applied at 10 lb. in the stiff-dough stage a residue of ca. 1 p.p.m. may have resulted. - D.M.L.S. [64(75.3)]

1119. THOMSSEN, C. (Karl Marx Univ., Leipzig, E.Germany). Possible poisoning of domestic animals by weedkillers. Arch.exptl Veterinarmed., 1958, 12,216-21.

On the basis of laboratory feeding tests with mice and rats it was determined that poisoning of domestic animals by the use of normal concentrations of sprays and dusts of 2,4-D was improbable. Bioassay for 2,4-D was possible with the use of carrot seedlings and 2,4-D in the tissues of guinea pigs could be extracted by water for bioassay. - From Chem.Abstr.54: 12460. - P.J.B.

1120. FEDERAL REGISTER, UNITED STATES. Tolerances for residues of 1-naphthyl-N-methyl carbamate. Fed.Register, 1960, 25, 3351-2.

The previous tolerances under the Federal Drug and Cosmetic Act are revised to include 10 p.p.m. in or on bananas, cucumbers and summer squash. From Chem.Abstr.54:12407. P.J.B.

1121. FEDERAL REGISTER, UNITED STATES. Tolerances for residues of maleic hydrazide. Fed.Register, 1960, 25,2076.

A tolerance of 50 p.p.m. in or on potatoes and 15 p.p.m. in or on onions (dry bulb) is established under the Food, Drug and Cosmetic Act for residues of MH. A maximum of 160 p.p.m. is permitted in potato chips as a result of applying MH to the growing plant. From Chem.Abstr.54:12407. - P.J.B.

1122. HOLLY, K. (Agric.Res.Council Weed Res.Org., Begbroke, Oxford, England). Problems in the use of soil-acting herbicides. N.A.A.S. Quart.Rev., 1961, (52),139-43.

Aspects reviewed include losses of herbicide

from the soil surface and through leaching and adsorption, incorporation of herbicides into the soil and their persistence. Circumstances to be borne in mind when making recommendations for the use of soil-acting herbicides are listed. - P.J.B.

1123. HEIKES, E. (State Coll., Bozeman, Montana, U.S.A.). Distribution of several soil sterilants due to leaching. The Weeds, 1960, 32,4-6.

A chart is included showing the comparative distribution in the soil, due to leaching under 3 in. of rainfall, of the following at 2 concentrations (actual dosages not given): simazine, Karmex [diuron], Telvar [monuron], TBA [2,3,6-TBA], borate, sodium chlorate, 2,4-D and dalapon. The possible responsibility of 2,4-D for blight on Box elder and other shelter belt trees is discussed. Some evidence to substantiate the theory has been obtained from laboratory studies. - D.M.L.S. [16(78.6)]

1124. NAGASAWA, K., NAGAMIZU, K., OKADA, S. and KIMURA, I. (Ihara Agric. Chemicals Co. Ltd., Japan). Formulation of triazine derivatives as herbicide. 1. Translocation of simazine in soil. Noyaku Seisan Gijutsu, 1960, No. 1, 9-12.

Simazine wettable powder suspensions were applied to soil and the distribution of adsorbed simazine determined. The extent of distribution increased as the particle size of the soil increased. Distribution was not significantly affected by differences in the surfactants used, though its extent was slightly increased by the use of anionic surfactants. Simazine, water and surfactants were adsorbed separately by soil. From Chem. Abstr. 54:14556. - P.J.B.

1125. BEHRENS, R. (Minnesota Agric. Exp. Sta., St. Paul, U.S.A.). Relative residual phytotoxicity of simazin and 2-chloro-4-ethylamino-6-isopropylamino-s-triazine (atrazine). Res. Rep. Joint 16th N. Central and 10th W. Canadian Weed Control Conf., 1959, 103.

In trials on Waukegan silt loam soil, simazine and atrazine each at 2, 6 and 12 # were applied on 14th November, 1958. Flax, wheat and oats were sown on 30th April, 1959, and soybeans on 27th May, 1959. Percentage kills of crops and weeds (mostly Amaranthus spp. and Setaria spp.) where simazine 2, 6 and 12 # was applied were 27, 77 and 100 for flax, 67, 80 and 100 for wheat, 60, 97 and 100 for oats, 0, 90 and 100 for soybeans, 63, 70 and 87 for broad-leaf weeds and 50, 70 and 87 for grass weeds, respectively. For atrazine 2, 6 and 12 #, percentage kills were 33, 73 and 83 for flax, 83, 100 and 100 for wheat, 93, 100 and 100 for oats, 37, 100 and 100 for soybeans, 70, 87 and 90 for broad-leaved weeds and 60, 87 and 90 for grass weeds, respectively. These results indicated that the residual phytotoxic effect was greater for atrazine than simazine. In September, 1959, weed growth was heavy on all plots, except those treated with either herbicide at 12 #. P.J.B. [O.W.]

1126. RANGEL, J.F. Persistencia do aminotriazol no solo. [Persistence of aminotriazole in the soil.] An. Semin. Brazil Herbicidas Ervas Daninhas 1958, 1959, 185-90, (Portuguese), tabs. 2.

A trial in which amitrole 5, 10 and 20 kg/ha was applied to 3 soil types 20, 40, 60 and 100 days before sowing sorghum indicated that amitrole does not persist more than 3-4 weeks in clay and organic soils, and is completely inactivated in sandy soils within 100 days. - D.M.L.S. [O.W.]

1127. JENSEN, H.L. (State Lab. for Soil and Crop Res., Dep. Bacteriol., Lyngby, Denmark). Some aspects of biological allyl alcohol dissimilation. Acta Agric. Scand., 1961, 11,(1),54-62, bibl. 9.

A report is given of studies on the induced activation of allyl alcohol and acrylate decomposition in soil and on the adaptive behaviour in vitro of Pseudomonas fluorescens and Nocardia corallina, both isolated from soils treated with allyl alcohol. The pre-treatment of soil with allyl alcohol eliminated the lag period in the decomposition of sodium acrylate added subsequently, and vice versa. Resting cells of P. fluorescens oxidized allyl alcohol and n-propanol by inducible enzymes, apparently with the formation of acrylic acid and propionic acid as intermediates. There was no evidence that lactic acid was a further intermediate. Allyl alcohol and n-propanol induced adaptation to each other in P. fluorescens, as did acrylate and propionate. N. corallina possessed inducible enzyme that oxidized allyl alcohol, with acrylic acid as an apparent intermediate, but n-propanol induced no adaptation to allyl alcohol and propionate none to acrylate. From Author's Summary. - P.J.B. [O.W.]

1128. KLYUCHNIKOV, L.Yu. and PETROVA, A.N. (Microbiol.Inst.,Moscow). Effects of herbicides on soil microflora after repeated use. [Mikrobiologiya, 1960, 29, 238-41,(Russ.).
Gives data of the effect of 2,4-D, kerosene and MCPA, applied during 2 years, on the soil microflora in the rhizosphere of oak seedlings. - P.J.B.

1129. MEDEIROS, A.G. Acao dos herbicidas: Shell 130, MCPB, Ervoxone, Estercide e Karmex W, sobre o crescimento de alguns fungos fitopatogenicos do solo. [Effect of the herbicides Shell-130, MCPB, Ervoxone, Estercide and Karmex W, on the growth of some phytopathogenic fungi of the soil.] An.Semin.Brasil Herbicidas Ervas Daninhas 1958, 1959, 171-84, figs.4, tabs.2, bibl.12.
The effect of Shell 130 (PCP in oil) 4%, MCPB 0.37%, Ervoxone (2,4-D (amine)) 1% Estercide (mixture of 2,4-D and 2,4,5-T esters) 0.75% and Karmex W (monuron) 0.3% on the following phytopathogenic soil fungi was studied in the laboratory: Diplodia natalensis, Phytophthora citrophthora, P. parasitica, Fusarium oxysporum f. lycopersici, Sclerotium rolfsii, Verticillium alboatrum, Pythium anhanidermatum, P. indigoferas, P. ultimum, and Phytophthora cinnamoni. Shell 130 was the most toxic, inhibiting all spp. and monuron the least, affecting only 2 spp. D.M.L.S. [O.W.]

APPLICATION AND MACHINERY

1130. VEZIN, C. La prevention des accidents dans l'application des produits chimiques en agriculture. [The prevention of accidents in the application of chemical products in agriculture.] Phytoma, 1960, 120, 9-14, (F.).
Practical precautions are outlined. D.M.L.S. [O.W.]

1131. JOHNSTONE, D.R. and BERRY, D.J. The use of fluorescent tracers in the determination of small amounts of insecticidal sprays. Joint Rep.T.P.R.U. Porton No.184 and A.E.R.U. Porton No.1/61. [n.d.], pp.10, figs.2.
Of more than 50 fluorescent tracers of potential value for estimating minute quantities of spray deposits, only the following showed sufficient stability to exposure to artificial light, combined with high light sensitivity, to be worth consideration for field use: Oil Colour 7G, β-methyl umbelliferone (both oil soluble) and Fluoresceine, Acridine Orange, Primulin and Lissamine Flavine (all water soluble). No material was entirely stable to light exposure. - P.J.B. [O.W.]

1132. WALKER, P.T. (Tropical Pesticides Res.Unit, Porton Down, Salisbury, Wilts, England). Distribution of granules by a commercial hand-operated distributor and their retention on maize plants. J.agric.Engng Res., 1961, 6, (2), 112-8.
Data are given of the distribution of granules (30/60 T.S.S. mesh) from the double-outlet nozzle of a hand-operated rotary knapsack duster and granule distributor, as used for applying insecticides for controlling maize stem borer. - P.J.B. [O.W.]

1133. AGRICULTURAL RESEARCH, How surfactants affect herbicides. Agric.Res. (Wash.), 1961, 9, (12), 3-4.
According to studies by L.L. Jansen and W.C. Shaw, one surface active agent (an alkyl-phenol ethylene oxide condensate) when used in trials with maize as a test plant, increased the toxicity of dalapon 7-fold and that of amitrole 3-fold, but did not affect 2,4-D or dinoseb. With soybeans as the test plant, it doubled the effect of dalapon and amitrole and trebled the effect of 2,4-D and dinoseb. The reasons for the influence of surface-active agents on the action of herbicides is discussed briefly. - D.M.L.S. [O.W.]

1134. COLLOMB, C. Les modalites des traitements par pulverisation sur les cultures basses. [Factors in the spraying of low crops.] Phytoma, 1960, 115, 23-27, (illus.), (F.).
Includes, in a section devoted to herbicides, a brief discussion of the influence of volume on selectivity. - D.M.L.S. [O.W.]

1135. DHUICQ, A. Le role de la pression dans la pulverisation mecanique. [The role of pressure in mechanical spraying.] Phytoma, 1959, 113, 23-6, (illus.), (F.), figs.1, tabs.1.
Includes a table giving the volume delivered, droplet dimension, and reach of spray, using 5 different pressures. - D.M.L.S. [O.W.]

1136. COURSHEE, R.J. Nat.Inst.Agric.Engng,

Wrest Park, Silsoe, Bedfordshire, England). Avoidance of drift from airborne sprayers, Outlook on Agric., 1961, 3,(2),76-80, figs.4, bibl.7.
Reviews theoretical and practical aspects of ways in which spray drift can be minimized. - P.J.B. [O.W.]

1137. NIERING, W.A. A potential danger of broadcast sprays, Bull.Conn.Arboretum 1959, 11,11-13.
A specific case is described in which application of a mixture of 2,4,5-T + 2,4-D esters as a broadcast spray to trees and shrubs up to a height of 4-6 ft along a roadside resulted in serious damage to shade trees. The cause was apparently the use of too high spray pressure and nozzles that produced a very fine atomized spray which tended to drift easily. - D.M.L.S. [25(74.6)]

1138. * JOHNSTONE, D.R. Performance of the modified S.A.6 boom and nozzle crop spraying installation fitted to a Dragonfly helicopter. Rep.colon.Pesticides Res.Unit, Porton Down, 1960, 175, pp.13, bibl.14.

1139. VASILEVSKIJ, I.G. [Increase of tractor-based units for the defoliation of cotton.] Khlopkovodstvo, 1960, (9),35-9, (Russ.), tabs.3.
Describes and tabulates data from studies on tractor-mounted sprayers and dusters for applying defoliants to cotton. The effectiveness of treatment with $CaCN_2$ and Mg $(ClO_3)_2$ depended largely on the set of the working parts and the distribution of the defoliant on the leaf surfaces. A consistent fall of leaves from all parts of the plant was obtainable only by increasing the rate of application of defoliant from the bottom to the top of the stem. Modifications of the sprayer to achieve this, with suggested angles and heights of spray, are given. The effectiveness of spraying was increased by reducing the droplet size while applying the same dosage, by adding wetting agents, and by increasing the concentration of the solution using a fine spray and at the same time reducing the dosage. Combined treatment with water spray and pure $CaCN_2$ dust was effective in dewy regions. In all regions the effectiveness of combined units was increased by arranging the apparatus so that the leaves were wetted before dusting. - K.A.B. [G.R.I.]

1140. CISLOV, Ju. A. Mechanizacija mul'cirovanija posevov v lesopitomnikah. [Mechanized mulching of sowings in forest nurseries.] Lesn.Hoz., 1960, 12,(5),60-1, (Russ.).
Described, with illustrations, the MN-1.0, a tractor-mounted and powered mulcher that distributes sawdust (or comminuted peat) in a strip 1 m wide and covers 2 ha/8-hour shift. For.Abstr.22:1755.

1141. van WIJK, A. Verslag van de nationale demonstratie met slootreinigingsmachines te Zuidlaarderveen op 21 Oktober, 1960. [Report of the National demonstration of ditch cleaning machinery held at Zuidlaarder Fen on 21 October, 1960.] Gestenc.Meded.Inst.voor Landbouwtechniek en Rationalisatie, 1961, No.5, pp.19, figs.14.
A review is given of a national demonstration in the Netherlands of different types of commercial farm ditch-dredging machinery, ditch-bank mowers and aquatic weed cutters. Descriptions, with illustrations, are given for each machine. - R.J.B. [212(492)]

PHYSIOLOGY, MORPHOLOGY AND ANATOMY

1142. JONES, M.B. and LAUDE, H.M. (Hopland Field Station, University of California, U.S.A.). Relationships between sprouting in chamise and the physiological condition of the plant, J.Range Mgmt, 1960, 13,(4),210-14, figs.3, tabs.2, bibl.12.
The results are given of an experiment in which Adenostoma fasciculatum was cut at 2-monthly intervals 6 times in a year and at each date after cutting sprout growth was measured, a chemical analysis made of plant fractions, and the growth rate, twig moisture, soil moisture and prevailing temperatures determined. Chemical analyses revealed significant seasonal trends in the content of starch, total sugars, glucose, protein, calcium, potassium, and phosphorous. It was found that a sharp rise in twig moisture immediately preceded a rapid increase in growth rate which was associated with an abrupt decline in stored starch reserves. The height of sprouts following spring growth the year after cutting was, in general, inversely related to twig moisture at the time of cutting and directly related to stored starch content of the root at the time of treatment. It is

suggested that twig moisture and level of stored starch may be used to indicate, at the time of treatment, the subsequent sprouting potential. - D.M.L.S. [O.W.]

1143. MILLER, C.S. and HALL, W.C. Texas Agric.Exp.Sta.,College Station,U.S.A.). Absorption and metabolism of aminotriazole in cotton. J.Agric.Fd Chem., 1961, 9,(3), 210-12,figs.1,tabs.3,bibl.17.

Four young cotton seedlings at the 2-true-leaf stage were painted with small amounts of amitrole, labelled with ^{14}C and harvested 1, 2, 4 or 8 days after treatment. Radio-autographs indicated the presence of 2 metabolites within 4 days of treatment, which were present in a ratio of 4:1. The amitrole had disappeared from the plants within 4 days after application. In experiments with mature plants, amitrole labelled with ^{14}C was applied as a spray to series of plants with all the bolls either open or closed. At harvest, there was no evidence of appreciable penetration of ^{14}C from the amitrole into the seed kernels from bolls open at the time of spraying, while the seed from bolls closed when sprayed, contained measurable amounts of ^{14}C. The younger the seed when the plants were treated, the greater was their radioactivity at harvest. Radioautographs of seed from treated plants showed that nearly all the ^{14}C was present in the form of the two metabolites found in the treated seedlings. The immersion of the cut petioles of single leaves in amitrole labelled with ^{14}C resulted in the accumulation of amitrole-^{14}C in the leaf blade. At 2 days after treatment, the leaves had metabolized about 20% of the absorbed amitrole. These results were considered to indicate that under normal conditions, amitrole is rapidly transformed to one of the two metabolites found and, after movement of this metabolite to the apical and axillary meristems, finally to the other metabolite, which is the final form and which is not readily translocated within the plants. The first-formed metabolite, however, is not transformed into the second metabolite after it has moved into the storage tissues of the seed. The metabolites were not identified, but were water-soluble. P.J.B. [O.W.]

1144. RAKITIN, Yu.V. and POTAPOVA, A.D. (K.A.Timirjazev Inst.Plant Physiol.,Acad. Sci.U.S.S.R.,Moscow). Penetration of herbicides in plants and their effects on phosphorus uptake. Fiziol.Rastenii,Acad.Nauk. S.S.S.R., 1959, 6,614-16.

The effect of (a) 4-iodophenoxyacetic acid, (b) sodium 2,4-dichlorophenoxyacetate and (c) chlorpropham on P uptake in beans, maize, wheat, sunflower and barley was studied. The P content of the younger leaves of beans and barley was decreased by (b). The content of P in beans was decreased and that in barley was increased by (c). From Chem.Abstr.54:14557. - P.J.B.

1145. ALLEY, H.P., BOHMONT, D.W. and HILLWORTH, H.M. (Wyoming Agric.Exp.Sta., Laramie,U.S.A.). The effects of dalapon on pectic substances and on root growth of sugar beets. J.Amer.Soc.Sug.Beet Technol., 1961, 11,(5),365-75.

In glasshouse trials in which dalapon was applied at 6 or 10 # to plants at the 2- to 4-leaf stage, the 10 # rate resulted in death in all cases. The 6 # rate resulted in reduced vigour and retarded root growth. In field trials, dalapon post-em. at 10 # significantly reduced sugar beet stands and considerably inhibited growth of foliage and roots. The 6 # rate resulted in less marked effects than the 10 # rate and its effect gradually wore off. The % of ethanol-insoluble solids in the roots rose rapidly after treatment with dalapon, but fell again as the growth-inhibiting effect of the dalapon gradually declined. The amount of pectic substances was reduced for at least 50 days after treatment with the 6 # rate. It was concluded that although the 6 # rate of dalapon resulted in some inhibition of root and foliar growth, this has not reduced root yields in practice at harvest and this rate appears to be suitable as a post-em. treatment. - P.J.B. [O.W.]

1146. CRAFTS, A.S. (Univ.California,Davis, U.S.A.). Comparative mobility of tracers in plants. Proc.9th internat.Bot.Congr., 1959, 2, 81-2,(Abstract).

A review. - D.M.L.S. [O.BO.]

1147. * WISNIEWSKI, P. Influence of the 2,4-D plant growth substance on germination of turions of Hydrocharis morsus ranae L. in darkness. Lublin U.M.Curie-Sklowdowskiej, Ann.Sect.C., 1959, 13,(1),1-4.

1148. CORNS, W.G. (Dep.Plant.Sci.,Univ. Alberta,Edmonton,Canada). Comparisons of wild oats, barley and wheat germinated in aqueous solutions of Avadex, Carbyne and fenac,

Res.Rep.Joint 16th N.Central and W. Canadian Weed Control Conf., 1959, 103.
Seed of wild oats, barley and wheat were held for 1 week at 21°C in darkness in Petri dishes containing solutions of di-allate and barban each at concentrations of 0.5-200 p.p.m. and fenac at concentrations of 1-200 p.p.m. Data are given of concentrations of each herbicide causing incipient or complete control of root and shoot growth. Concentrations of barban required to give complete growth inhibition in wild oats were very low, which suggested the desirability of studying the value of barban formulations as soil treatments for wild oat control. - P.J.B. [O.W.]

1149. KOSIKOVA, P.G. (Agric.Inst., Stavropol, U.S.S.R.). Germination of seeds of some weeds and ruderal plants after treatment with gibberellic acid at various concentrations. Doklady Akad.Nauk.S.S.S.R., 1960, 130,922-4.
Gibberellic acid (GA) at concentrations of 0.0001-0.03% was used to treat seed of Berteroa incana, Lepidium draba, Hyoscyamus agrestis, Bupleurum rotundifolium, Thlaspi arvense, Kochia scoparia, Amaranthus retroflexus and Pachyphragma macrophyllum. K. scoparia showed no germination response to different concentrations and with A. retroflexus and P. macrophyllum germination was nil in all cases. The other species all showed increasing germination as the concentration of GA increased. Germination of T. arvense was greatest at the 0.005% concentration. Other plants relatively unaffected by GA concentration were Plantago stepposa and Salvia nemorosa. From Chem.Abstr.54: 15809. - P.J.B.

1150. HAMILTON, S. and CANNY, M.J. (Central Res.Labs, ICIANZ, Ascot Vale, Victoria). The transport of carbohydrates in Australian bracken. Aust.J.biol.Sci., 1960, 13,(4). 479-85, bibl.16.

1151. JAGENDORF, A.T. and MARGULIES, M. Inhibition of spinach chloroplast photosynthetic reactions by p-chlorophenyl-1,1-dimethylurea. Arch.Biochem.Biophys., 1960, 90, 184-95, bibl.33.

1152. SIRCAR, S.M. and RAY, A. (Bot.Dep. Univ.Calcutta, Calcutta 19, India). Growth substances separated from the root of water hyacinth by paper chromatography. Nature, 1961, 190,(4782), 1213-4, bibl.2.
Separation of active fractions in extracts from the roots of Eichhornia crassipes indicated the presence of growth substances other than indole compounds and gibberellins. P.J.B. [O.W.]

PATENTS

1153. HACKMANN, J.T. and TEN HAKEN, P. (Shell Res., Ltd.). Herbicidal compositions. Brit.Pat.828 871; 24.2.60.
The compounds comprise a surface-active agent, + a solid or liquid carrier and a symmetrical or unsymmetrical diester of carbonic acid or an ester: 1,2,2,2-tetrachloroethyl allylcarbamate, bis[1-chloro-1-(2-chlorophenyl)methyl] carbonate, 1,2,2,2-tetrachloroethyl diallylcarbamate or bis (1,2,2,2-tetrachloroethyl)carbonate. These compounds were effective against Avena fatua, Agropyron repens and Sinapis sp. From Chem.Abstr.54:13531. - P.J.B.

1154. SLINKERD, H.O. (Dow Chemical Co.). 3-(Haloaryloxy)-1,2-propanediol esters. U.S.Pat.2 850 526; 2.9.58.
Preparation.

1155. BURGER, A. (Virginia-Carolina Chem.Corp.). Dialkylaminoalkyl phosphonates and phosphinates. U.S.Pat. 2 917 533; 15.12.59.
Preparation.

1156. GYSIN, H. and KNÜSLI, E. (J.R. Geigy A/G). Triazine. U.S.Pat.2 923 614; 2.2.60.
Preparation of 2-bromo-4,6-bis(ethylamino)-s-triazine and 2-bromo-4,6-bis(isopropylamino)-s-triazine. From Chem.Abstr.54:13153. P.J.B.

1157. LINDEMANN, R.F. (Diamond Alkali Co.). Herbicidal compositions containing dimethyl 2,3,5,6-tetrahaloterephthalates. U.S.Pat. 2 923 634.
Herbicidal properties and preparation.

1158. JOSEPHS, M.J. Control of vegetation growth by 2,3,6-trichlorobenzyl alcohol. U.S.Pat.2 926 078; 23.2.60.
2,3,6-Trichlorobenzyl chloride at 2-30 p.p.m.

in soil gave selective suppression of germinating seeds and emerging seedlings of grass and broad-leaved weeds in maize crops. From Chem.Abstr.54:12471. - P.J.B.

1159. LANG, L. (National Sugar Refining Co.). Liquid dispersions of acetals of a sugar. U.S.Pat.2 927 054; 1.3.60.
Water-insoluble derivatives, prepared by treating sucrose and propionaldehyde with various aldehydes and ketones, were found to impart sticking properties to pesticides. From Chem.Abstr.54:14144. - P.J.B.

1160. ANDERSON, A.W. (Dow Chemical Co.). Ether esters of sucrose. U.S.Pat.2 927 919; 8.3.60.
Ether esters of carboxylic acid, prepared by treating a diglicidyl ether of a polyoxyalkylene glycol with equimolar amounts of both a hydroxyalkyl sucrose and an appropriate acid and catalyst are useful as ingredients in plant growth control. Thus, 4.4 g 2,4,5-trichlorophenoxyacetic acid, 9.6 g diglycyl ether of polyoxyethylene glycol 12.2 g (hydroxyethyl)-sucrose ether and 0.25 g tetramethylenetetramine is held at 85°C for 6 hours to give a water-soluble syrup, effective as a herbicide, with 98% control of Brassica rapa and Phalaris canariensis. A table gives the properties and herbicidal effect of 12 diglycidyl ethers of polyglycols. From Chem.Abstr.54:14143. - P.J.B.

1161. ROSEN, I. (Diamond Alkali Co.). 3-halo-2,3-dihydrothiophene 1,1-dioxides and their use as nematocides and herbicides. U.S.Pat.2 928 766; 15.3.60.
Preparation.

1162. KLOETZEL, M. and FRISCH, D.M. 4-thianaphtheneacetic acids. U.S.Pat.2 930 800; 29.3.60.
The carboxylic derivatives, and the sulphoxides and sulphones of 4-thianaphtheneacetic acid were plant growth regulators. From Chem.Abstr. 54:16465. P.J.B.

1163. RUSSEL, D.R. (Dow Chemical Co.) Grass weed control with dialkyl mononitrophenols. U.S.Pat.2 935 392; 3.5.60.
Selective and persistent control of grass weeds is reported with dialkylmononitrophenols in suitable carriers. Among active compounds are 2,4-di-tert-butyl-6-nitrophenol and 2,4-di-tert-amyl-6-nitrophenol. From Chem.Abstr.54:15820. - P.J.B.

1164. KONZ, W., SEHRING, R. and ZEILE, K. (C.H.Boehringer Sohn). Derivatives of phenoxyacetic acid as herbicides. Ger.Pat. 1 009 421; 29.5.57.
In an example, amyl 2,4,5-trichlorophenoxyacetyl lactate (70 pts) is mixed with butyl ricinolatesulphonate (30 pts) and this solution emulsified in water. From Chem. Abstr.54:12068. - P.J.B.

1165. MUTH, F., EUE, L and WEGLER, R. (Farbenfabriken Bayer A/G). Selective herbicides. Ger.Pat.1 013 460; 8.8.57.
The herbicides contain a trichloroacetylpolychlorophenylamide as an effective agent against dicotyledonous plants. It is effective at greater concentrations against monocotyledons. Thus, trichloroacetyl-3,4-dichlorophenylamide was used as a 0.05% emulsion at 1000l/ha to kill weeds. Also useful are w-trichloroacetyl-2,3,4,6-tetrachlorophenylamide and 2,3,4,5,6-pentachlorophenylamide. From Chem.Abstr. 54:16733. - P.J.B.

1166. HAMBSCH, E. (Farbwerk Hoechst A/G). Isatins as selective herbicides. Ger.Pat. 1 013 459; 8.8.57.
Isatin and its alkyl or halo derivatives are useful as pre- and post-em. herbicides. These compounds will kill dicotyledonous plants, but not grasses. Compounds used in the examples include 5,7-dichloro-, 4-chloro-, 6-chloro- and 5-bromoisatin. From Chem. Abstr.54:16733. - P.J.B.

1167. FETTES, E.M. and HERENBAUM, M.B. (Thiokol Chem.Corp.). Additives for agricultural sprays. Ger.Pat. 1 014 377; 22.8.57.
Powdered, dry mixtures of organic dithiosulphates and mono-, poly-, or hydrosulphides are mixed with H_2O to give suspensions of polymeric polysulphides. When 1-30% (preferably 10%) of the dry mixture is added to insecticides, fungicides, etc., sprayed on plants, an active, weather resistant layer is formed on the leaves. From Chem.Abstr.54:16730. - P.J.B.

1168. BARNSLEY, G.E., EATON, J.K. and AIRS, R.S. (Shell Res.,Ltd.). Organic boron compounds as herbicides. Ger.Pat. 1 016 978; 3.10.57.

Examples show the herbicidal effectiveness of 4-chloro- or 4-bromo- and 4-methoxybenzeneboronic acid and bis(4-chlorophenyl)borinic acid. From Chem.Abstr.54:16733 - P.J.B.

1169. WINDEL, H., WESCHKY, L., FISCHER, A., STUMMEYER, H., PFAFF, C. and STEINBRUNN, G. (Badische Anilin u.Soda-Fabrik,A/G). Hydantoin derivatives as herbicides. Ger.Pat. 1 018 261; 24.10.57.
Derivatives of hydantoin having the general formula $Yn\text{-}1C_6H_4N.C(:O)N(R).CH_2C(:O)$ are described. Examples describe the use of 1-methyl-3-(p-chlorophenyl)hydantoin. From Chem.Abstr.54:16732. - P.J.B.

1170. GÄTH, R., GRAF, F., WURZSCHMITT, B. and HUPPERT, V. (Badische Anilin u.Soda Fabrik A/G). Treatment of agricultural soils, Ger.Pat. 1 028 564; 24.4.58.
The soil is covered with a layer of porous resins (especially amino resins), to which may be added fertilizers, insecticides, herbicides, etc., to improve plant growth and prevent the development of weeds, fungi and insects. The resin is applied through a wide-slot nozzle to give a thickness of 1-10 mm. From Chem.Abstr.54:15802. - P.J.B.

1171. FISCHER, A., STUMMEYER, H., HERTEL, O. and PASEDACH, H. (Badische Anilin u.Soda Fabrik A/G). Weed killers. Ger.Pat.1 032 970; 26.6.58.
The title compositions contain 1-(2-cyclohexylidenecyclohexyl)-3-allylthiourea or 1-(2-cyclohexylcyclohexyl)-3-allylthiourea or their derivatives, which are substituted on the N in 1 and/or 3 position by an alkyl, alkenyl, allynyl, hydroxyalkyl or cycloalkyl group. The preparation is described. From Chem.Abstr.54:15820. - P.J.B.

1172. FARBENFABRIKEN BAYER A/G. Herbicides. Ger.Pat. 1 035 062; 7.8.58.
Effective substances are aryl sulphonamides of aminothiazoles. Examples include 4-(p-aminobenzenesulphamido)thiazole and 2-(p-aminobenzenesulphamide) thiazole. From Chem. Abstr.54:17781. - P.J.B.

1173. MITTELBERGER, K.H., HAMBSCH, E., HAHNE, H. (Farbwerke Hoechst A/G). Herbicides. Ger.Pat. 1 036 567; 14.8.58.
The substances contain perchlorobutadiene carboxylic acid (probably $CCl:CCl.CCl:CClCOOH$) and/or its salts, esters and amides. From Chem.Abstr.54:16733. - P.J.B.

MISCELLANEOUS

1174. HARADA, T., ISHIDA, S. and HAMAGUCHI, H. (Shiraoka Exptl Fm,Nissan Chem.Industr.Ltd.,Saitama,Japan). Contamination of Dithane wettable by ethyl ester of 2,4-D. Noyaku Seisan Gijutsu, 1960, No.1,16-18.
Dithane wettable powder which had been stored in a polyethylene plastic bag in contact with 2,4-D ethyl ester wettable powder in another polyethylene bag (0.07 mm thick) showed phytotoxicity as a result of contamination with 2,4-D caused by powder diffusion through polyethylene film. Polyvinyl chloride film 0.07 mm thick almost completely prevented contamination. From Chem.Abstr.54:14555. - P.J.B.

1175. LEIB, E. (Pflanzensohutzdienst, Bonn, West Germany). Problemes phytosanitaires de l'Allemagne Federale. [Plant protection problems in Federal Germany]. Phytoma, 1959, 108,38-42,(F.),figs.1.
The author describes (1) the administration of and coordination between the various Federal and Länder scientific research organizations concerned with plant protection and (2) the (voluntary) official approval scheme for pesticides in Federal Germany. - D.M.L.S. [O.W.]

1176. VEZIN, Ch., and BOURON, H. La normalisation des produits antiparasitaires en agriculture. [The standardization of pesticides in agriculture.] Phytoma, 1959, 113,29-31,(F.).
With reference to the French Law in regard to the sale of simple products,(i.e. those used in the pure state), the conditions governing the grant of official approval to other products (e.g. standardization of procedure for experimental approval trials), and nomenclature of chemical products. D.M.L.S. [O.W.]

1177. WEBBER, R. Keeping down the weeds. Grower, 1961, 56,(1),30-1,(illus.).
A short account of weed research work in the horticultural field at the Agricultural Research Council's new Weed Research Organization at Begbroke Hill, near Oxford. D.M.L.S. [O.W.]

List of Common Names and Chemical Abbreviations

The following list based on that adopted by the Weed Society of America, has been approved by the British Weed Control Council, except for those marked □.
An asterisk (*) signifies common names approved by the B.S.I.
A plus sign (+) signifies approval by the Weed Society of America.

amiben □+	3-amino-2,5-dichlorobenzoic acid
amitrole □+	3-amino-1,2,4-triazole
AMS □+	ammonium sulphamate
atrazine □+	2-chloro-4-isopropylamino-6-ethylamino-1,3,5-triazine
barban □	4-chloro-2-butynyl-N-(3-chlorophenyl)carbamate
CDAA +	2-chloro-NN-diallylacetamide
CDEA +	2-chloro-NN-diethylacetamide
CDEC +	2-chloroallyl-NN-diethyldithiocarbamate
chlorpropham *	isopropyl-N-(3-chlorophenyl)carbamate
4-CPA +	4-chlorophenoxyacetic acid
4-CPB	4-(4-chlorophenoxy)butyric acid
2,4-D +*	2,4-dichlorophenoxyacetic acid
3,4-DA +	3,4-dichlorophenoxyacetic acid
dalapon +*	2,2-dichloropropionic acid
2,4-DB *	4-(2,4-dichlorophenoxy)butyric acid
DCU □+	dichloralurea
2,4-DEB +	2,4-dichlorophenoxyethyl benzoate
2,4-DES *	2,4-dichlorophenoxyethyl hydrogen sulphate
di-allate	2,3-dichloroallyl diisopropylthiolcarbamate
dichlone +*	2,3-dichloro-1,4-naphthoquinone
dinosam *	2-s-amyl-4,6-dinitrophenol
dinoseb *	2-s-butyl-4,6-dinitrophenol
diquat +*	$(1,1'$-ethylene-2,2'-bipyridylium$)^{2+}$
diuron +*	N-(3.4-dichlorophenyl)-N'N'-dimethylurea
DMTT □+	3,5-dimethyltetrahydro-1,3,5,2H-thiadiazine-2-thione
DNOC *	2-methyl-4,6-dinitrophenol or 3,5-dinitro-o-cresol
2,4-DP	2-(2,4-dichlorophenoxy)propionic acid
endothal +	3,6-endoxohexahydrophthalic acid
EPTC □+	ethyl-NN-dipropylthiolcarbamate
erbon +	2-(2,4,5-trichlorophenoxy)ethyl-2'2'-dichloropropionate
fenac □+	2,3,6-trichlorophenylacetic acid
fenuron +*	N-phenyl-N'N'-dimethylurea
ipazine □+	2-chloro-4-diethylamino-6-isopropylamino-1,3,5-triazine
MCPA +*	4-chloro2-methylphenoxyacetic acid
MCPB *	4-(4-chloro-2-methylphenoxy)butyric acid
MCPES +	sodium 4-chloro-2-methylphenoxyethyl sulphate
mecoprop *	dl 2-(4-chloro-2-methylphenoxy)propionic acid
MH □+	maleic hydrazide
monuron +*	N-(4-chlorophenyl)-N'N'-dimethylurea
neburon +	N-(3,4-dichlorophenyl)-N'-butyl-N'-methylurea
NPA +	N-1-naphthylphthalamic acid
paraquat	$(1,1'$- dimethyl-4,4-bipyridylium$)^{2+}$
PCP +	pentachlorophenol
PMA +	phenylmercuric acetate
propazine □+	2-chloro-4,6-bis(isopropylamino)-1,3,5-triazine
propham *	isopropyl-N-phenylcarbamate
simazine +*	2-chloro-4,6-bis(ethylamino)-1,3,5-triazine
SMDC □+	sodium methyl dithiocarbamate
2,4,5-T +*	2,4,5-trichlorophenoxyacetic acid
2,4,5-TB	4-(2,4,5-trichlorophenoxy)butyric acid
2,3,6-TBA +	2,3,6-trichlorobenzoic acid
TCA +	trichloroacetic acid
2,4,5-TES +	sodium 2,4,5-trichlorophenoxyethyl sulphate
2,4,5-TP	2-(2,4,5-trichlorophenoxy)propionic acid
trietazine □+	2-chloro 4-diethylamino-6-ethylamino-1,3,5-triazine

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